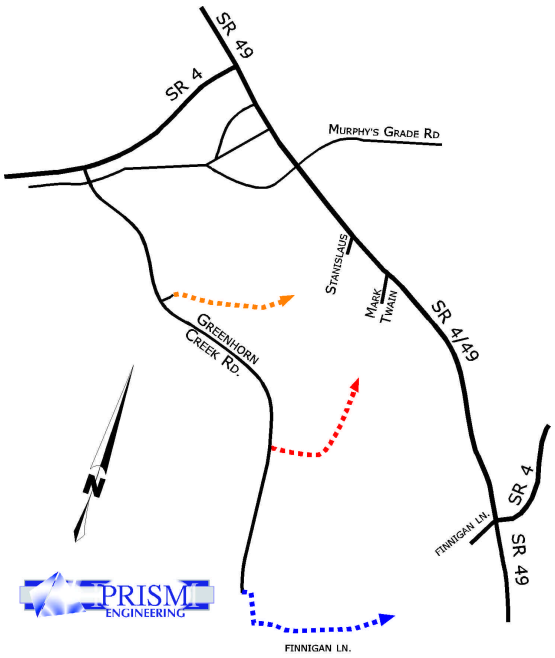
PRISM ENGINEERING

FINAL REPORT



Green Horn Creek Access Road Study
In the City of Angels

Prepared for the City of Angels, CA
under the direction of Weber Ghio, Inc.

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Executive Summary

This study examined the impacts/benefits of installing three different connector roads from Greenhorn Creek Road to existing City streets connecting into existing historical neighborhoods. The streets that potentially are impacted from the changes include Greenhorn Creek Road, Tuolumne Avenue, Gold Cliff Road, and Finnegan Lane (and all other roads in between that lead to Main Street). These connections are defined as follows:

- Access A: Sierra Ave to Tuolumne Ave
- Access B: McCauley Ranch Rd. to Gold Cliff Rd.
- Access C: Greenhorn Creek Rd. to Finnegan Lane

Several traffic engineering methods were employed in this study to determine the pros and cons of installing new connector roads. Capacity analysis was used at key study intersections to make a comparison between alternatives. Trip distribution assumptions (how traffic patterns would change with the connectors) were also fully documented in the analysis section of this report. Safety was also a primary factor.

Although the change in traffic patterns did not create a capacity problem on any of the streets (in fact, it helps to reduce impacts at key intersections), there is concern over safety relating to the increased traffic activity that is expected to take place along residential roads if the connectors were put in. In order to mitigate the potential safety issue of increasing two-way traffic on narrow residential roads, it is recommended that the existing streets along the path of Gold Cliff/Hillcrest/Mark Twain Road be improved to the City's standard 24 foot road width. This will allow for the safe passage of two-way traffic, and increase traffic safety for those that already live on these streets.

It is the conclusion of this study that the connector roads will provide more benefit to the City and its residents than it would create impacts. The impacts can be overcome with the widening of certain roads to City standards, and with the eventual installation of additional traffic signals along Main Street to accommodate cumulative growth on Main Street. The signals will provide a way for the existing residents to even get out onto Main Street. The connector roads provide some relief to existing residents in the short term as traffic congestion on Main Street continues to increase in the future. As Main Street volumes keep going up, it will become increasingly more difficult to get out of the neighborhood. The connector roads address this real and growing circulation problem.

The connector roads will also provide a more direct access to Main Street for residents living along Greenhorn Creek Road. As drivers shift some traffic patterns with new circulation opportunities, the congestion along Main Street is expected to reduce as is shown in the analyses section of this report. Main Street at Murphy's Grade Road, for example, is expected to improve from LOS D to LOS C in the future as traffic patterns are allowed to go a more logical and direct route with the connector roads. There will be reductions on Main Street traffic from residents in the historical areas who can more easily travel west and north if they are allowed to use Greenhorn Creek Road instead of Main Street. There will also be reductions on Main Street traffic if Greenhorn Creek Road residents are allowed to more easily travel east and south on SR 49.

Although in each case, these numbers are fairly small, they do help to reduce the critical congestion areas along Main Street by at least 10%, and this is equivalent to an improved grade in level of service (LOS D to LOS C, for example). If even more reductions on Main Street are realized by existing historical area residents making trips to the west and north along Greenhorn Creek Road as is expected, then the benefits to Main Street may be as high as 20% reductions. In this report, a worst-case analysis[1] was assumed so as to not be overly optimistic on the benefits of the connector roads. Even with the worst-case assumptions, the benefits are significant, and outweigh the impacts (which can be mitigated with the bringing of certain roads into compliance with City standard cross section width of 24 feet).

Recommendations

- The City should install at a minimum, Access B Connector Road to improve traffic flows and patterns in the City.
- The City should improve Gold Cliff/Hillcrest/Mark Twain Road to be a uniform 24 foot cross section of paved road to allow for safe passage of two-way traffic.
- The City should eventually install a signal at Main Street and Mark Twain Road to allow traffic to get out onto Main Street.
- Ideally, the City should install all three access connector roads A, B, and C to spread the load of traffic to more streets, and reducing impacts to all roads.

[1] The traffic patterns of the existing residents in the historical residential areas was assumed to not change with the new connector road installations. Although this is not realistic, it does give the "lower end" of benefits in this report. The benefits are actually expected to be higher than shown in this report.

Introduction

The purpose of this study is to examine the impacts of installing additional connector roads to enhance circulation options in Angels Camp. The primary collector streets in the study area are shown in Figure 1 below. Five study intersections were analyzed in this report, and are shown in Figure 2.

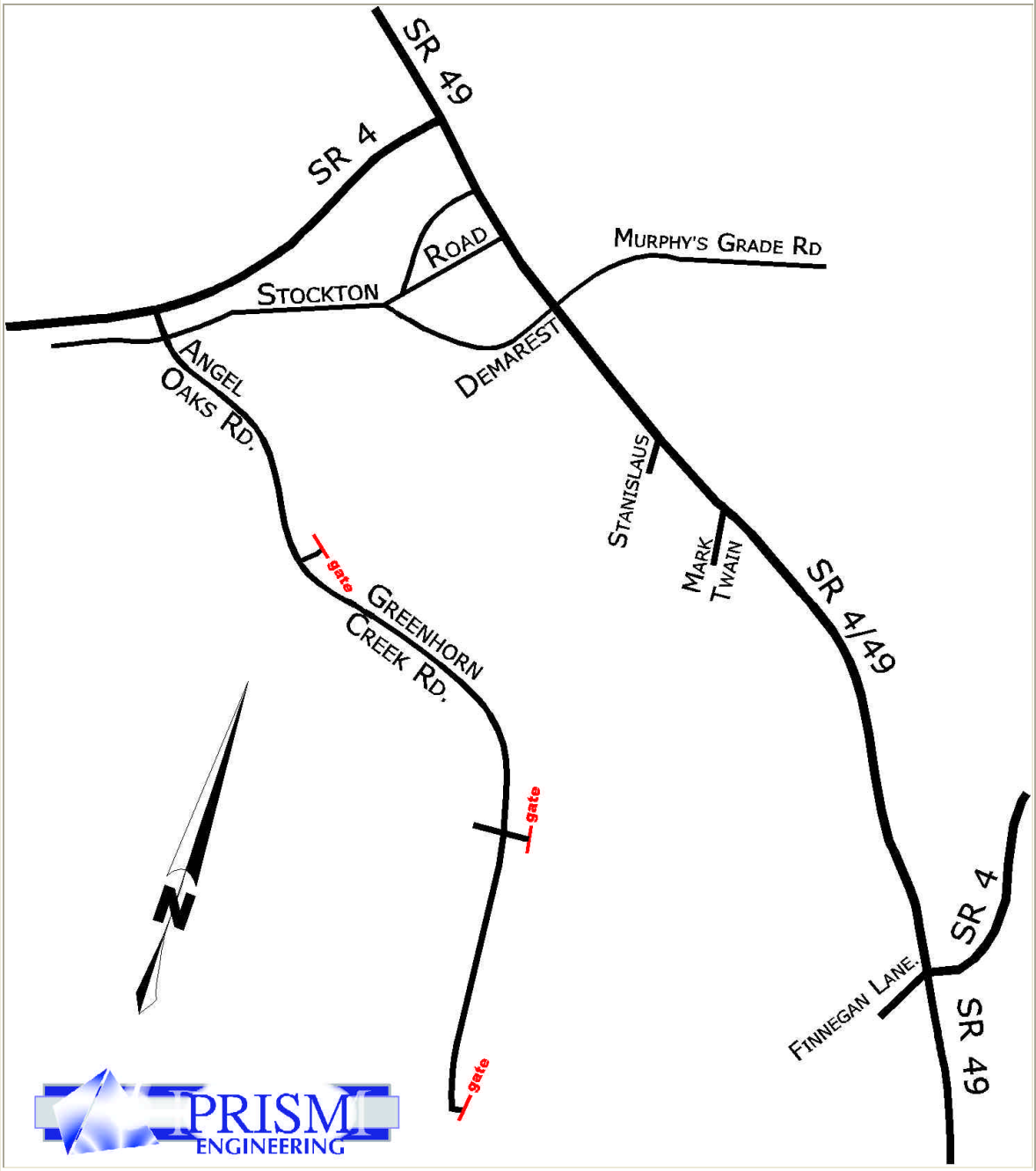


Figure 1 Study Area Existing Roadways

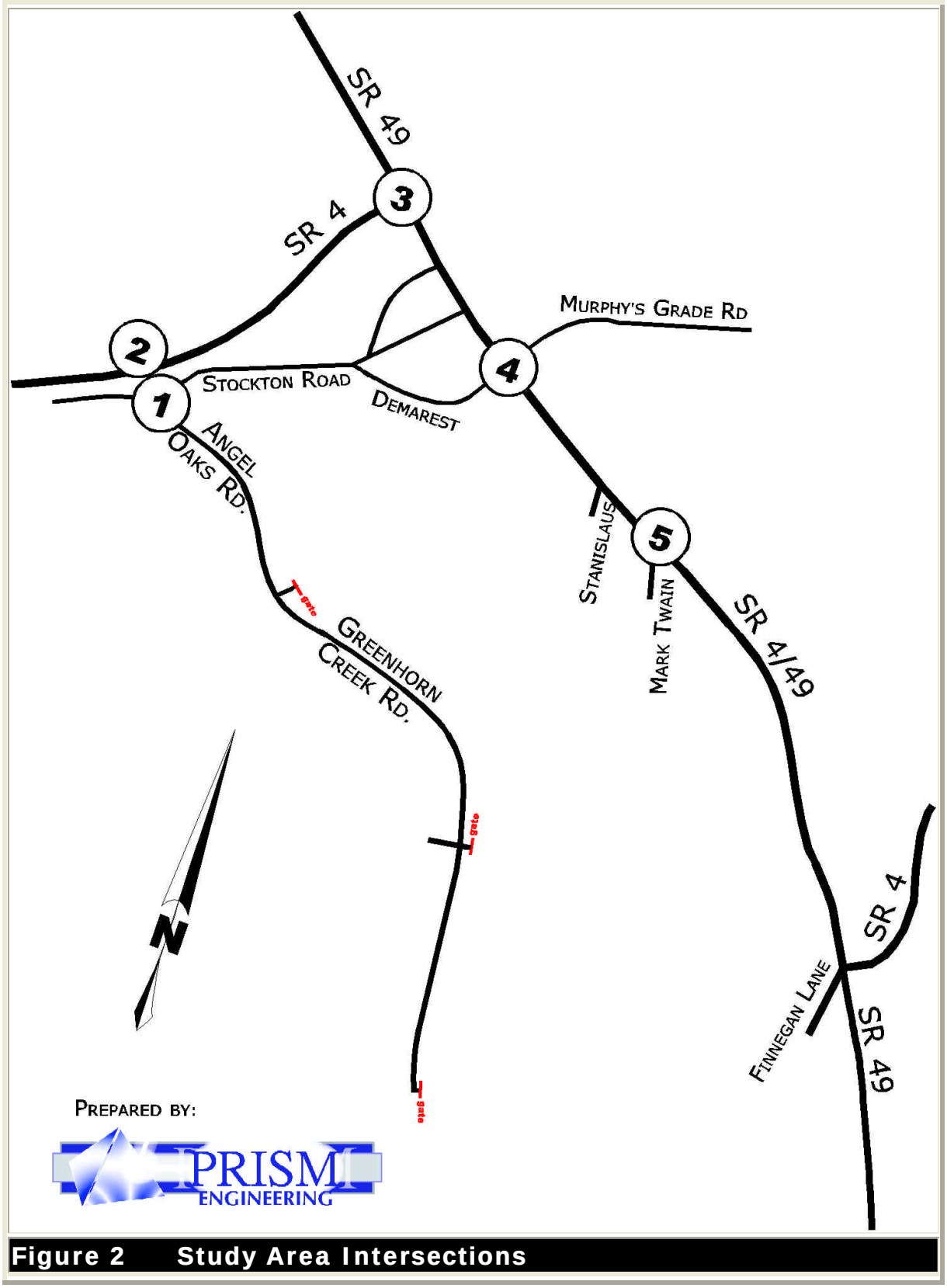


Figure 2 Study Area Intersections

These five study intersections provide a means to compare alternatives for benefits or impacts relating to the changing of circulation patterns in the study area.

In this study, six scenarios were examined for the proposed Green Horn Creek Access Road alternatives. These scenarios are related to the connection of Greenhorn Creek Road to City streets to the east of Greenhorn Creek Road, for the purpose of relieving traffic impacts to Angels Camp at the SR 4/49 signalized intersection, and other intersections along Main Street (SR 4/49) in Angels Camp.

The current circulation system in Angels Camp has no connections to the newer subdivisions to the west of Greenhorn Creek Road. All inbound and outbound traffic from these hundreds of homes is forced to travel north on Greenhorn Creek Road / Angel Oaks Drive to travel to SR 4 to gain access to other parts of Angels Camp. A significant portion of this traffic is using Stockton Road as a short cut path to bypass the SR 4/49 intersection. However, this option is limited as the proximity of the Main Street and Stockton Road intersection to the Main Street and Murphy's Grade intersection is approximately 500 feet (this close spacing can create traffic operations issues, as the traffic queues on Main Street often exceed this distance in the southbound direction).

Because of these traffic queues and congestion, the City has desired to see if there could be any benefit to providing additional circulation opportunities between Greenhorn Creek Road and areas to the east of Greenhorn Creek Road in an effort to reduce impacts along Main Street, etc. This study examines the transportation benefits and impacts associated with these circulation changes.

Existing Setting

The main streets in the City of Angels are the State-owned and operated arterial roadways known as State Route (SR) 49, and SR 4. These two highways operate as City arterial streets within the City, having signals and stop sign control at key intersections, and they carry the most traffic of any street in the City. Current traffic volumes along SR 49 in the City of Angels are at 16,800[2]. average daily vehicles (ADT) The peak daily volume is 17,400 ADT, and the peak hour volume is averaging 1,750 vehicles per hour. These levels of traffic volume are high for a city downtown street, where there is only one lane in each direction. Traffic volumes continue to grow, and the impacts to the City streets are getting worse.

The existing roadways in the study area are described in the following paragraphs. Figure 3 is a photo documentary of key locations on these streets and their intersections.

Angel Oaks Drive:

This collector level street begins at SR 4 on the north and continues southerly until it becomes Greenhorn Creek Road just past Live Oak Drive. There are curbs with some sidewalks along this street. Residential development exists along the street throughout, and other small collector roads feed into this main collector road. There is some slight vertical curvature (rolling hills terrain).

Greenhorn Creek Road:

This collector level street takes over where Angel Oaks Drive leaves off. They are in fact the same street but the street name changes at Live Oak Drive. At its south end (near Finnegan Court), there is a fence/barricade to end the road. Much of the road has a landscaped median, and there are curbs on the east edge of the road and sidewalks on the west edge of the road. There are street connections for residential development along the street throughout, and other small collector roads feed into this main collector road. There is some slight vertical curvature (rolling hills terrain).

Mark Twain Road:

This is a two lane collector roadway connecting Main Street to residential areas to the west of Main Street in downtown. Mark Twain has a stop sign

[2] *Source: Caltrans Traffic and Vehicle Data Systems Unit, 2004 All Traffic Volumes on CSHS*

control at Main Street, but Main Street is uncontrolled. There is a left turn pocket on Main Street that provides access into Mark Twain, and there is a two-way left turn lane in the median of Main Street immediately to the north of the Mark Twain intersection. This allows for easier access of Mark Twain traffic onto Main Street when turning left to go north on Main Street.

Murphy's Grade Road:

A two lane arterial roadway connecting Main Street (SR 4/49) with City and County destinations to the east. This road carries significant levels of traffic to and from the Main Street corridor, including high school related traffic. The roadway cross section varies from three lanes (there is a median two-way left turn lane in vicinity of Bret Harte High School) with curbs and sidewalks, to two lanes after passing the school and approaching Gardner Lane. After Gardner Lane, Murphy's Grade Road has no curbs, sidewalks or shoulders. This road eventually connects to SR 4 on east end.

State Route (SR) 4:

This State owned facility is a two lane rural highway connecting west County with East County, and having a break in route through the City of Angels (SR 49 connects SR 4 on north with SR 4 on south end of City). Extending west from SR 49, this highway has edge lines with ample shoulder on each side to accommodate parking, etc. This rural highway also connects to Angel Oaks Drive.

Main Street (State Route 4/49):

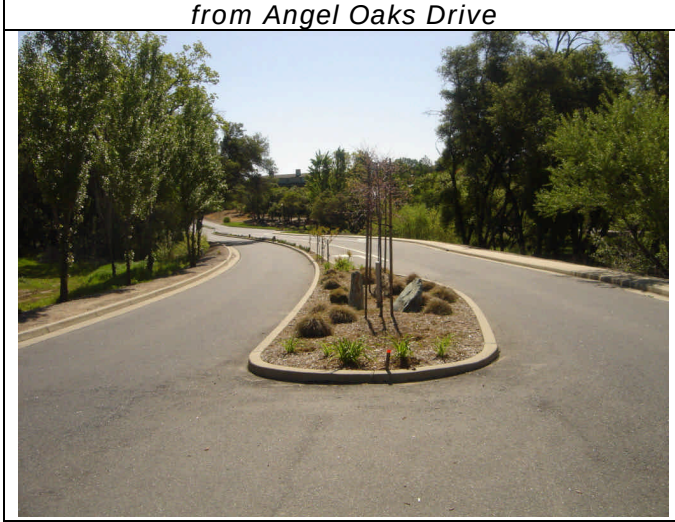
This State-owned facility is a three lane rural highway (one lane in each direction, with a two-way left turn lane in the center median) in the study area. It has edge lines with ample shoulders on each side of the road to accommodate parking, etc. Traffic is uncontrolled from the north City Limit to the SR 4 intersection where a signal is installed. The next signalized intersection is at Murphy's Grade Road.

Angel Oaks Drive looking south from SR 4 to Stockton Road intersection

Stockton Road facing east from Angel Oaks Drive

Stockton Road facing west from Angel Oaks Drive

Angel Oaks Drive facing north To Stockton Road and SR 4 intersections



Greenhorn Creek Road facing south just before Sierra fire exit (left turn pocket)

Facing east to Sierra Fire Exit "A" from Greenhorn Creek Road intersection

Figure 3A Study Area Intersection Approach Photos

Greenhorn Creek Road facing south at Fire Exit "B" intersection (Golf Course on right)

Greenhorn Creek Road facing north at Fire Exit "B" intersection (Golf Course on left)

Facing east on Fire Exit "B" from Greenhorn Creek Road intersection

Facing south at end of Greenhorn Creek Road near Finnegan Road connector

Facing north on Greenhorn Creek Road from south end at Finnegan connector

Finnegan Road facing east to SR 4/49 intersection

Figure 3B Study Area Intersection Approach Photos

SR 49 looking south
to SR 4 signalized intersection

SR 4 looking east
to SR 49 signalized intersection

SR 49 looking north
to SR 4 signalized intersection

SR 49 looking south at Murphy's Grade
signalized intersection

SR 49 / SR 4 facing south
to Mark Twain intersection

SR 49 facing south to SR 4 intersection with
Finnegan on right

Figure 3C Study Area Intersection Approach Photos

Access Connector Road Scenario Descriptions

Six different scenarios were examined in this study to determine how traffic patterns might change if new access roads are connected to the east from Greenhorn Creek Road in the future. Currently there are three fire road access gates installed along Greenhorn Creek Road from Live Oak Drive on the north to its south end (a barricade fence). Figure 4 shows the location of the three potential access roads and where they connect to Greenhorn Creek Road.

These six specific scenarios are described below:

1. Connect Access Road A to Greenhorn Creek Road
    - This connection would take place as shown on Figure 4 and would provide access directly to Tuolumne Avenue, providing connections to Main Street via Stanislaus or Mark Twain.
2. Connect Access Road B to Greenhorn Creek Road
    - Traffic using this connection would primarily travel to the Mark Twain / Main Street intersection.
3. Connect Access Road C to Greenhorn Creek Road
    - Traffic using this connection would travel to the Finnegan / Main Street intersection.
4. Connect Access Roads A and B to Greenhorn Creek Road
    - The combination of these two connectors provides additional opportunities to spread the traffic load more uniformly to Stanislaus and Mark Twain intersections with Main Street. It also lessens the impacts to any one of the existing neighborhood streets relating to the opening of these connectors.
5. Connect Access Roads B and C to Greenhorn Creek Road
    - The combination of these two connectors provides additional opportunities to spread the traffic load more uniformly to Mark Twain and Finnegan intersections with Main Street.
6. Connect Access Roads A, B, and C to Greenhorn Creek Road
    - This scenario is best because it spreads the traffic load that would travel to Main Street and reduces the impacts to the local neighborhood surface streets.

The analysis will show that spreading the load to three connectors reduces the delay to Main Street intersections, and lessens the impacts to neighborhood streets. The alternative that has the strongest traffic attractions over the others is the connector at the midpoint of Greenhorn Creek Road (Access B).

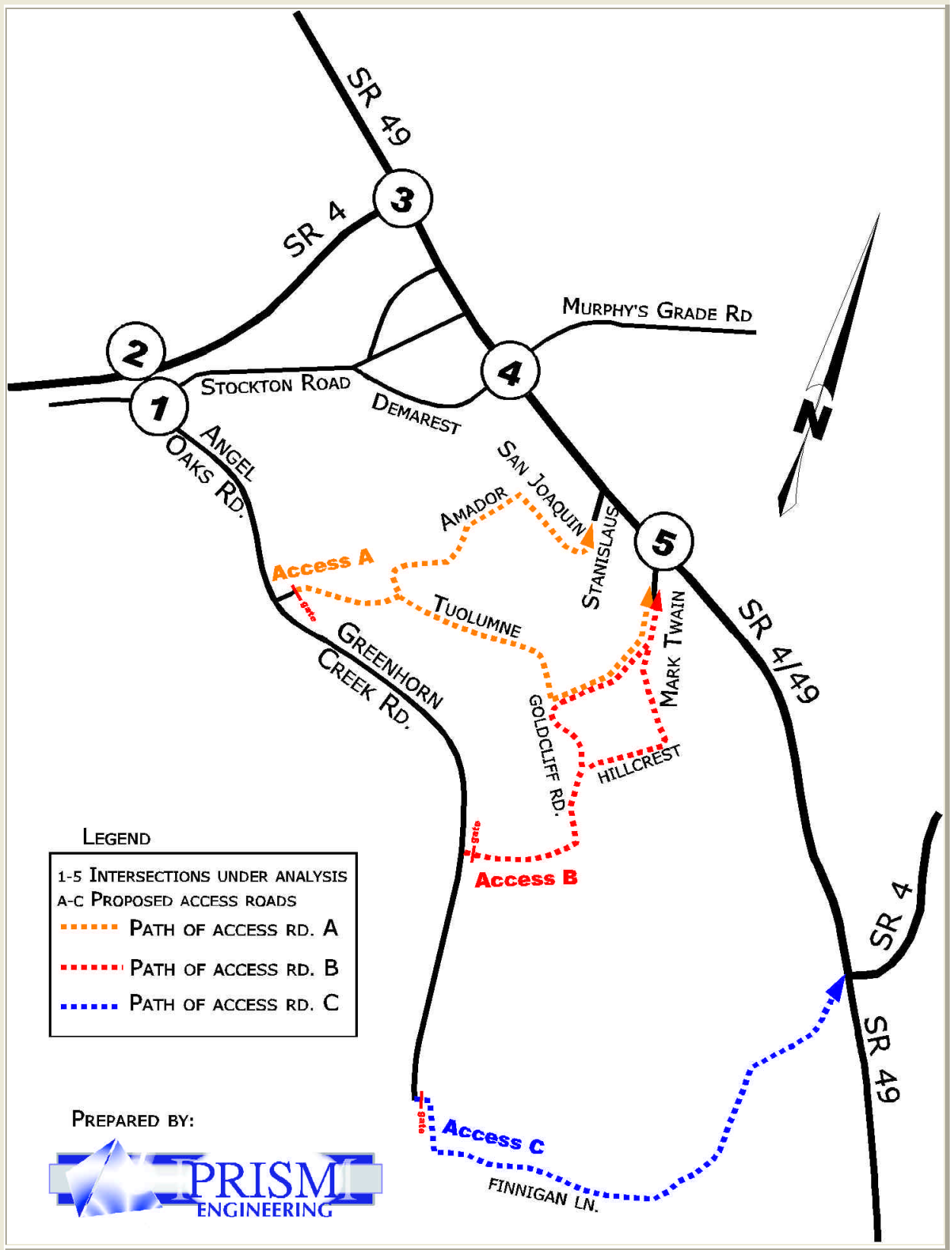


Figure 4 Access Road Connection Locations and Logical Paths

Analysis of Alternative Scenarios

Six alternative scenarios were analyzed for impacts and ramifications due to the local and regional traffic pattern shifts relating to any one of the alternatives. The methodology for analysis includes analyzing the level of service at various study intersections, reporting pm peak hour volume changes on various street segments, and trip distance impacts, etc. The HCM Unsignalized Report is based on the HCM 2000 Chapter 17. In addition, the SynchroPro model provides a full implementation of the HCM 2000 Signalized Operations method. These are the only methodologies reported in this study (HCM 2000 is one of the more conservative methods).

Intersection levels of service can be measured in terms of volume to capacity ratio, and a corresponding rank of level of service as follows:

LOS A < 0.60
LOS B >0.60 and < 0.70
LOS C >0.70 and < 0.80
LOS D >0.80 and < 0.90
LOS E >0.90 and < 1.00
LOS F >1.00

Table 1 summarizes what the level of service would be at an unsignalized or signalized intersection given varying degrees of delay to motorists at the intersection. As can be seen from the table, the amount of tolerable delay decreases with unsignalized intersections because the perceived anticipation to get through the unsignalized intersection quicker is greater than at a signalized intersection where people generally accept that delays will occur.

Table 1, Delay Level of Service Criteria

LOS	Unsignalized	Signalized
A	1-10 seconds	1-10 seconds
B	11-15 seconds	11-20 seconds
C	16-25 seconds	21-35 seconds
D	26-35 seconds	36-55 seconds
E	36-50 seconds	56-80 seconds
F	51+ seconds	81+ seconds

Source: PRISM Engineering, Synchro Pro, and HCM

A traffic model analysis tool, SynchroPro and SimTraffic was set up for this analysis. Figure 5 shows the extent of this tool, which replicated the existing year 2005 and future year 2025 volumes along the main City streets

in the study area for the six different connection scenarios described in the previous section.

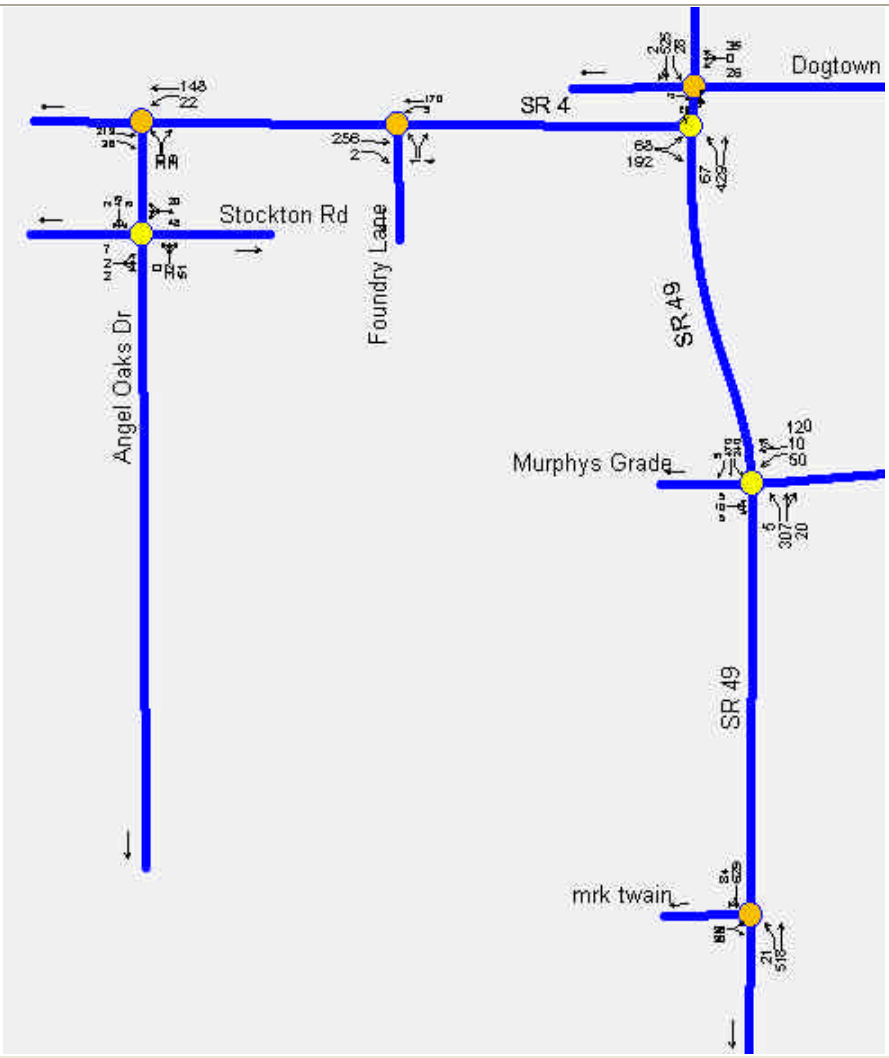


Figure 5 SynchroPro Traffic Model Analysis Tool

Our analysis included the use of this tool to assign traffic and determine "HCM compatible" levels of service for each of the five study intersections.

Figure 6 shows the pm peak hour Year 2005 traffic volumes (taken and developed by PRISM Engineering) for the five study intersections. including:

1. Angel Oaks Drive at Stockton Road
2. SR 4 at Angel Oaks Drive
3. SR 49 at SR 4 (signal installed)
4. Main Street (SR 49) at Murphy's Grade Road (signal installed)
5. Main Street (SR 49) at Mark Twain Road

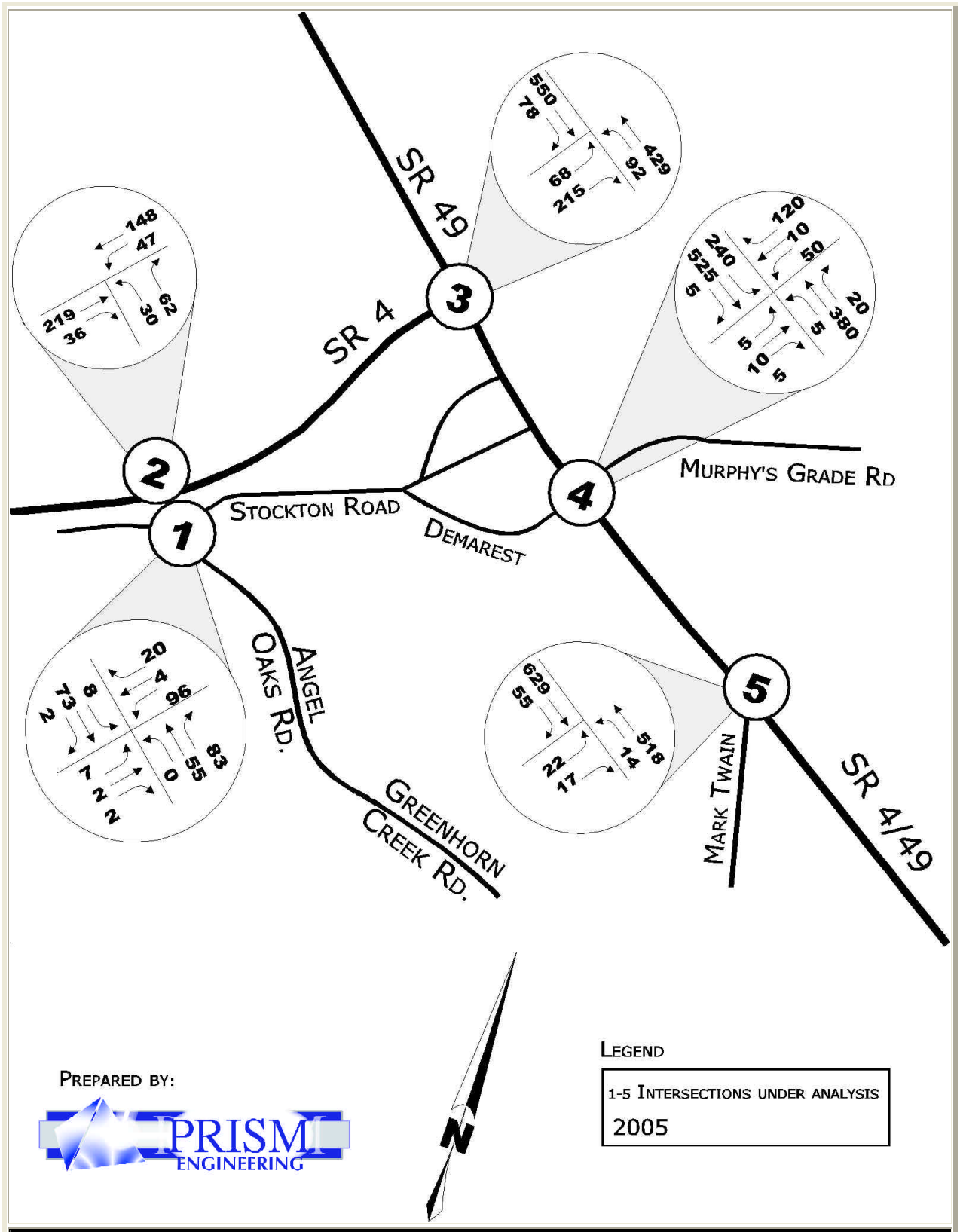


Figure 6 Year 2005 PM Peak Hour Traffic Volumes

PRISM Engineering conducted new am and pm peak hour traffic counts at the intersections of Angel Oaks Drive at Stockton Road and at SR 4. In addition, new am and pm counts were taken at the intersection of Main Street and Mark Twain Road. These new counts were used to update (as necessary) the counts at study intersections 3 and 4.

Table 2 reports the various average delays and corresponding levels of service for the five study intersections, for the Year 2005 existing conditions (shown in Figure 6), as well as when proposed circulation access scenarios 1 through 6 are implemented (Figures 7, 8, 9, 10, 11, and 12).

Figure 7 shows the traffic assignment when one connector (Access A) is opened up from Greenhorn Creek Road. The pm peak hour traffic volumes are shown on the figure that represent the shift in traffic that was expected to take place. PRISM Engineering determined that approximately 80% of traffic using Greenhorn Creek Road / Angel Oaks Drive would have destinations to the east (towards downtown Angels), and 20% had destinations to the west along SR 4. A significant amount of traffic is using Stockton Road as a shortcut/bypass to using SR 4 and having to pass through the signalized SR 4/49 intersection (and potentially wait at the signal). At the current time, this traffic pattern works, but as traffic grows along Main Street in the future, it is expected that this shortcut will grow unattractive when vehicles can no longer easily enter or exit Stockton Road from Main Street. If no other alternative circulation options are given (such as Scenarios 1-6), the traffic situation will grow worse in the future. This is verified in Table 2 which shows that when the circulation option(s) are put into place, the average delay at each of the study intersections is reduced. This is even more apparent in the Year 2025 scenario covered in the next chapter.

As can be seen from the table, all intersections would operate at an LOS B or better conditions overall, regardless of the scenario. Since the purpose of this study was to examine the impacts of shifting traffic from the SR 4/49 route to local surface streets, it was important to measure the amount of increased delay that this change could have on the traffic trying to get out to Main Street from Mark Twain Road, etc. For this reason, the side street delay and level of service is reported for Mark Twain Road since it is stop sign controlled and Main Street is uncontrolled.

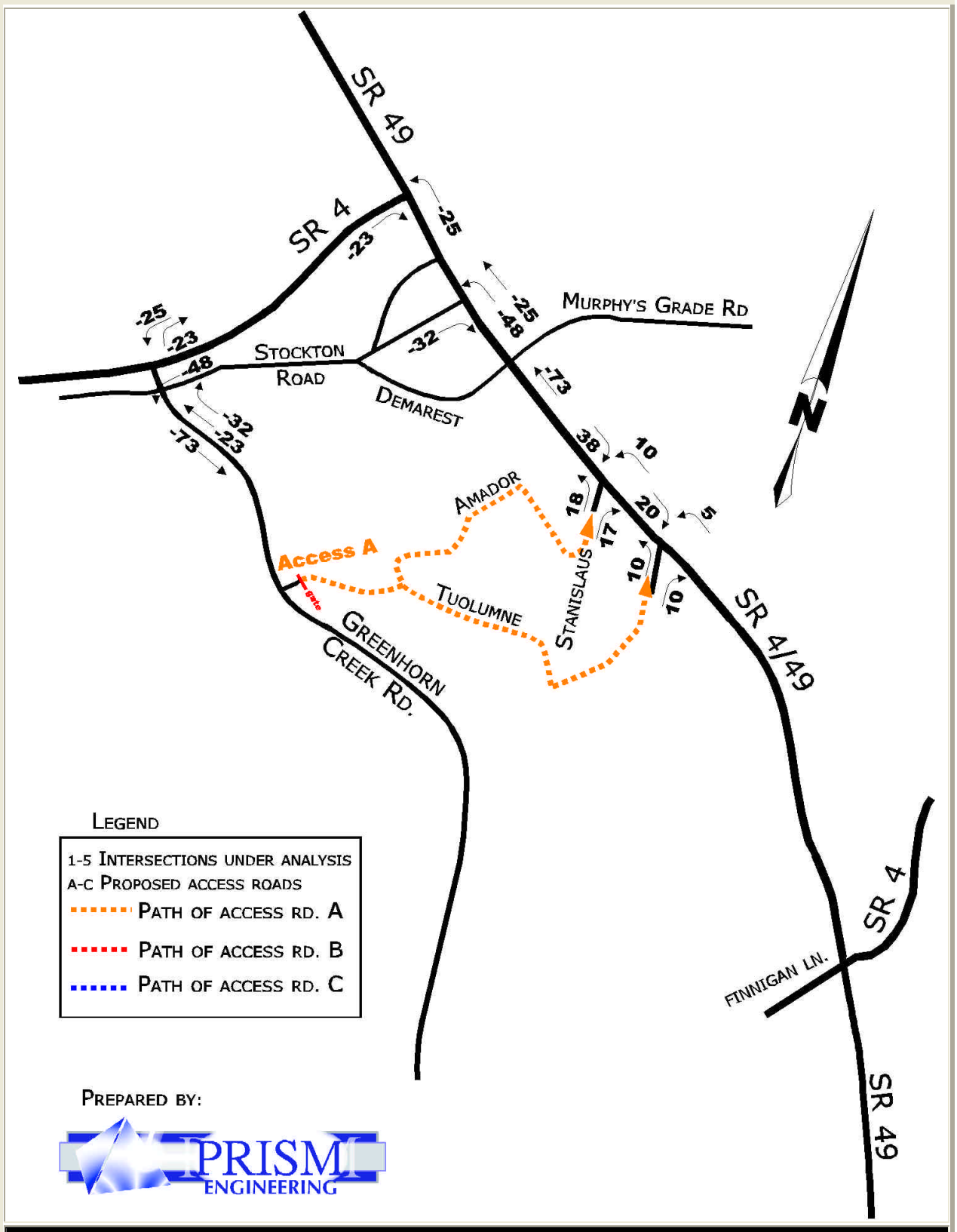


Figure 7 Year 2005 PM Peak Hour Scenario 1 Traffic Assignment

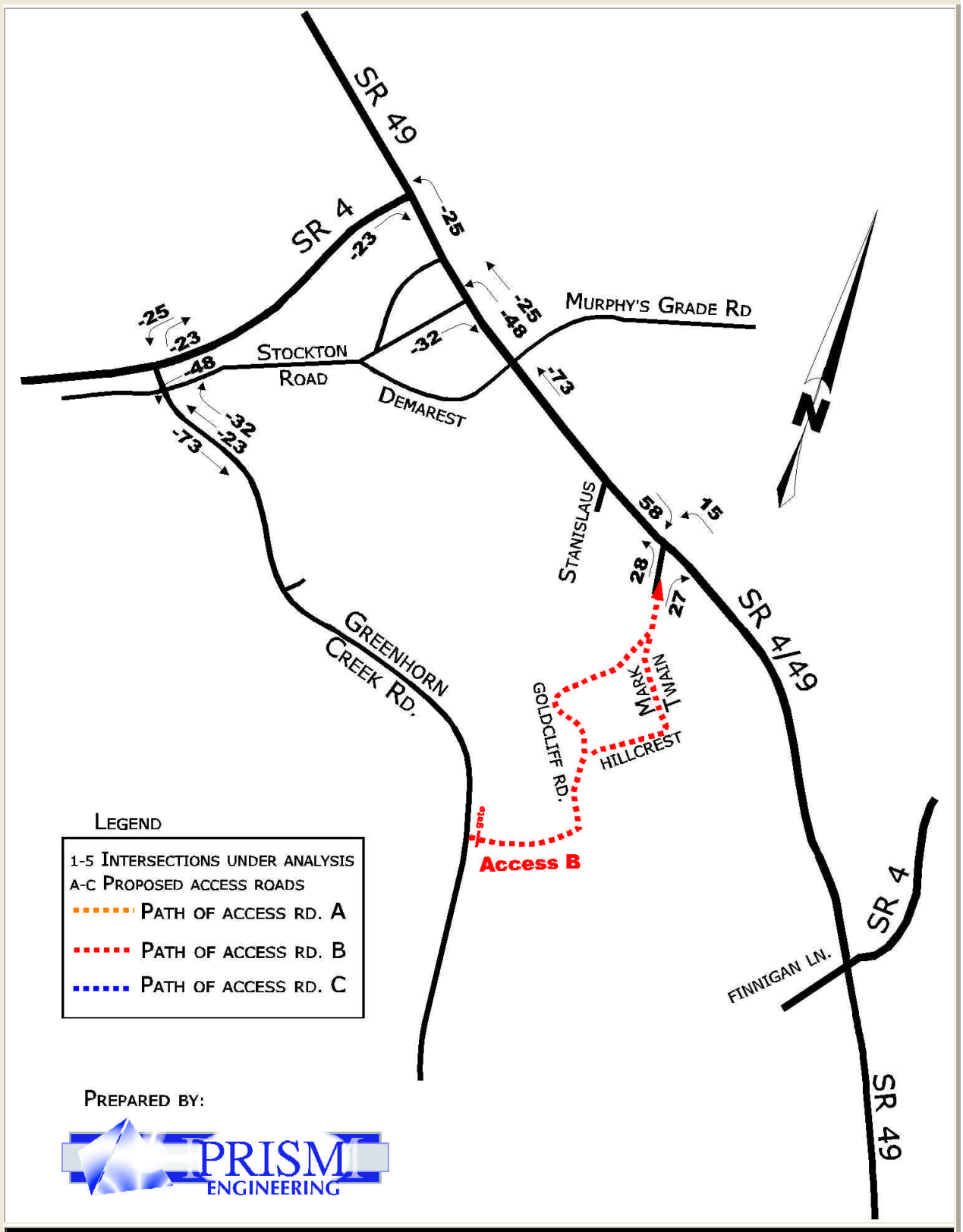


Figure 8 Year 2005 PM Peak Hour Scenario 2 Traffic Assignment

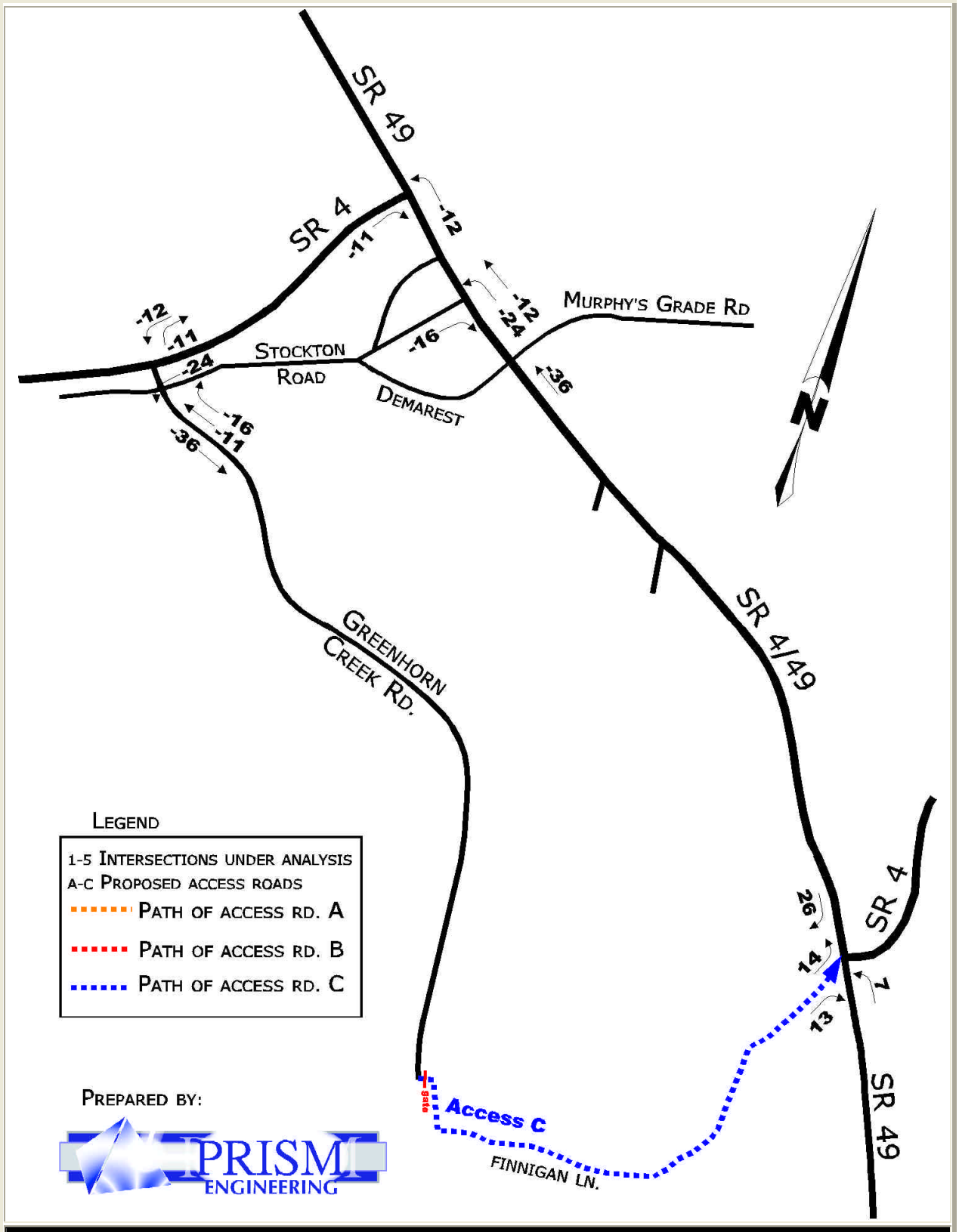


Figure 9 Year 2005 PM Peak Hour Scenario 3 Traffic Assignment

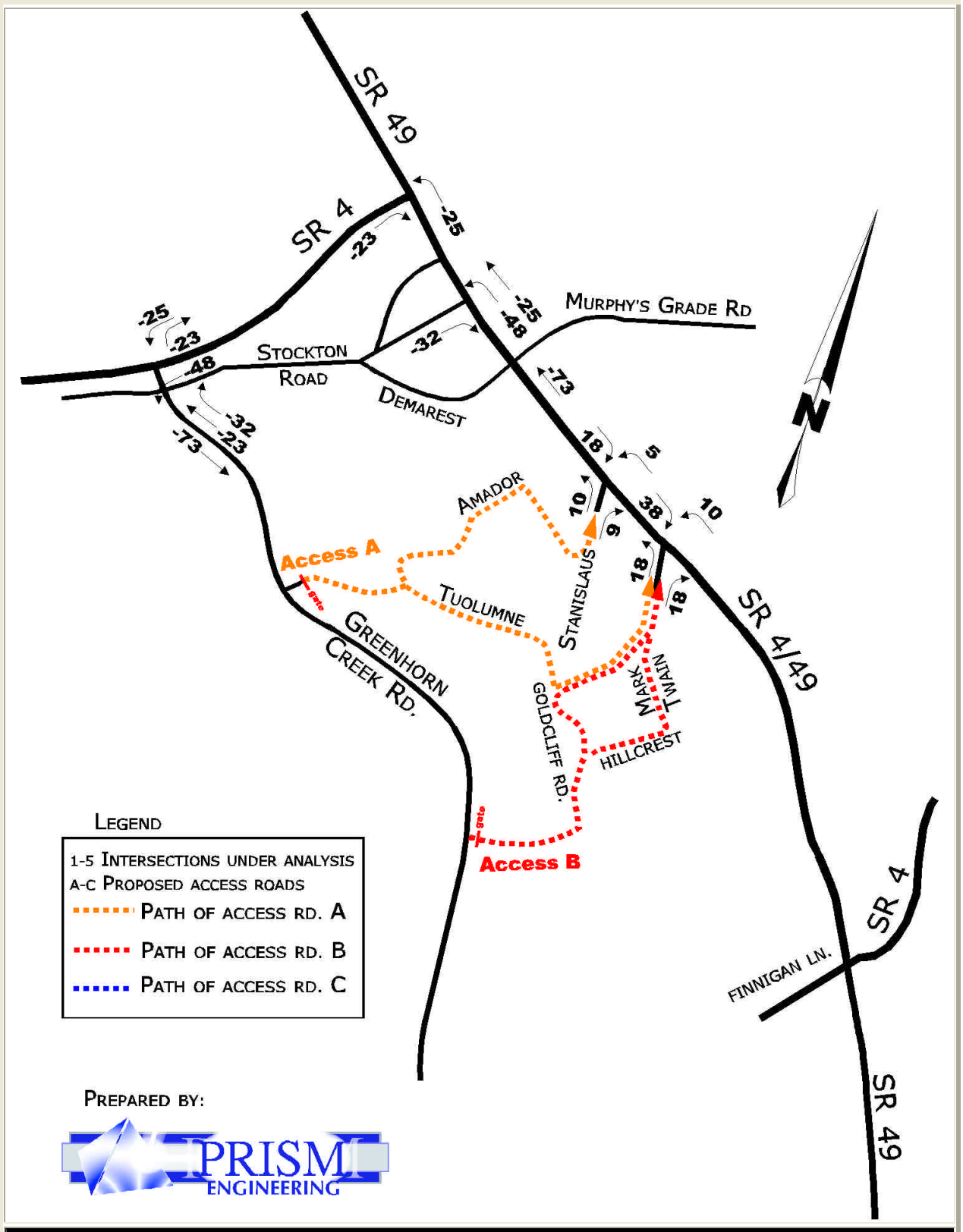


Figure 10 Year 2005 PM Peak Hour Scenario 4 Traffic Assignment

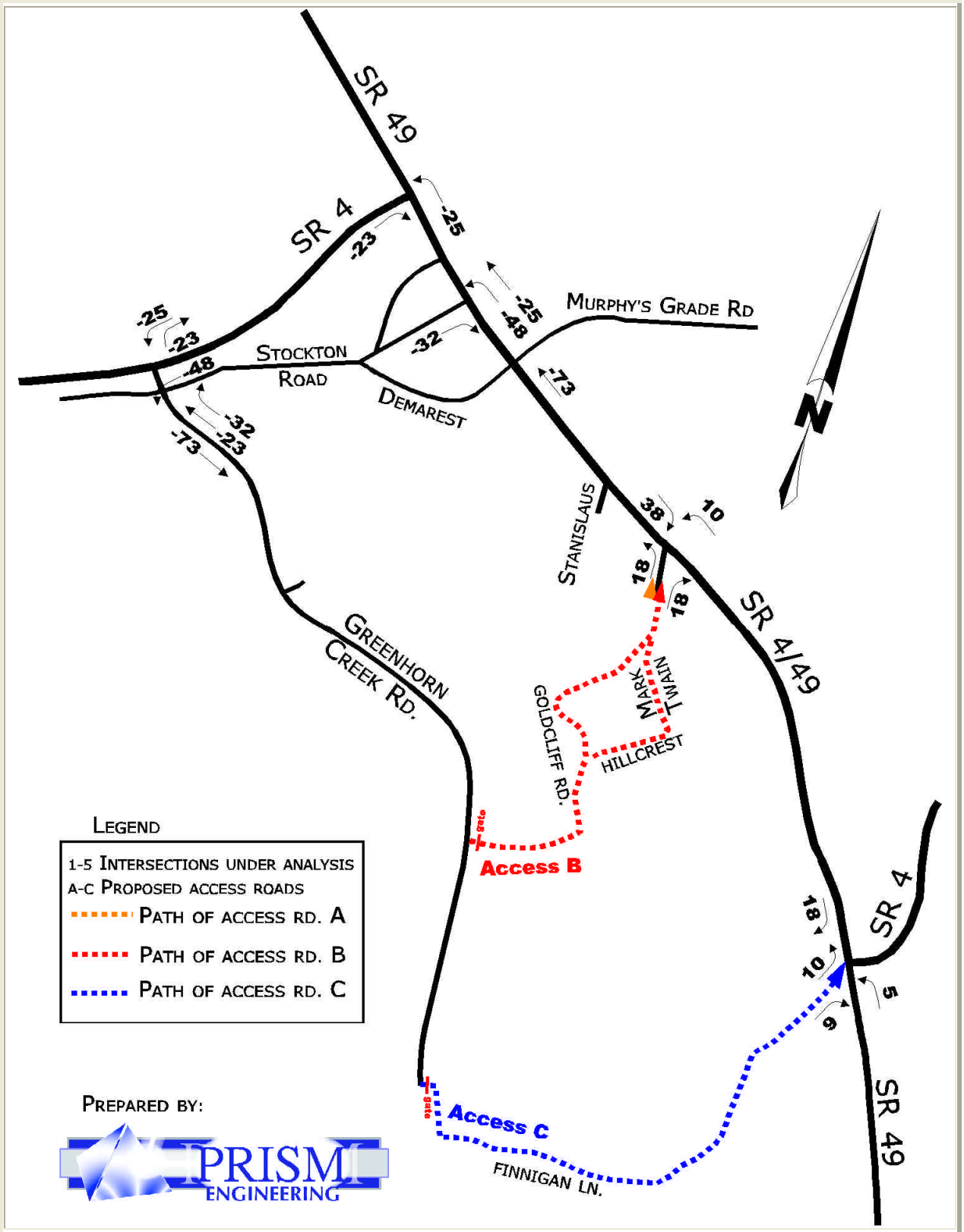


Figure 11 Year 2005 PM Peak Hour Scenario 5 Traffic Assignment

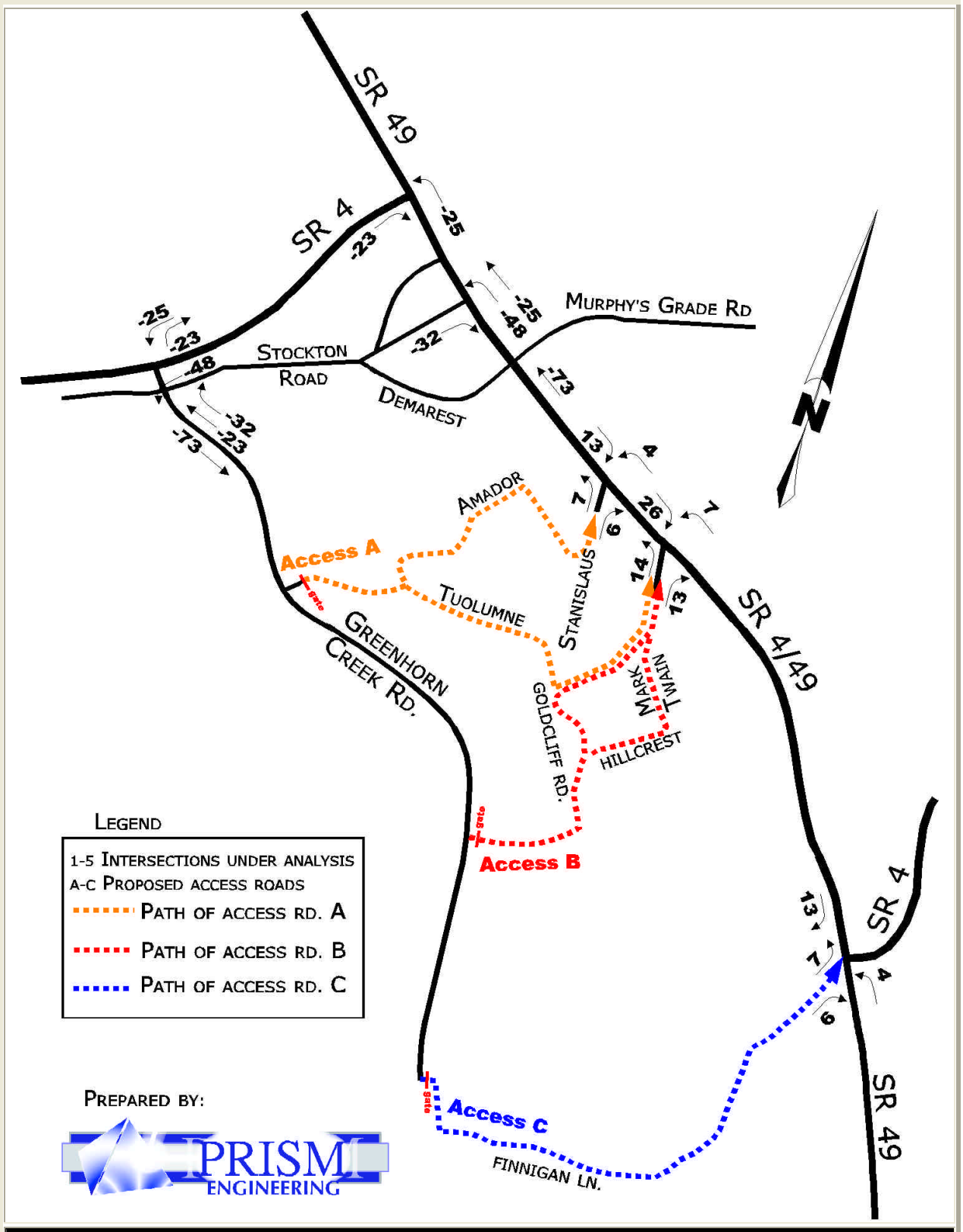


Figure 12 Year 2005 PM Peak Hour Scenario 6 Traffic Assignment

Table 2

Intersection Level of Service Analyses Summary for Year 2005 PM Peak Hour Scenarios

Year 2005 Scenarios	No Access Options		Access Road A		Access Road B		Access Road C		Access Roads A&B		Access Roads B&C		Access Roads A,B,&C	
Intersection	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 Angel Oaks and Stockton Road	4.1	A	3.8	A	3.8	A	3.9	A	3.8	A	3.8	A	3.8	A
2 SR 4 and Angel Oaks Road	2.5	A	1.8	A	1.8	A	2.5	A	1.8	A	1.8	A	1.8	A
3 SR 4 and SR 49	12	B	9.9	A	9.9	A	10.8	A	9.9	A	9.9	A	9.9	A
4 SR 49 and Murphy's Grade Road	16.3	B	15.6	B	15.6	B	15.9	B	15.6	B	15.6	B	15.6	B
5 SR 49 and Mark Twain Road*	22.8*	C*	26.5*	D*	35*	D/E*	24.7*	C*	30.1*	D*	30.1*	D*	28*	D*

*This only represents the side street Delay and LOS

Source: SynchroPro Software output, based on City's traffic volumes and projections (see appendix)

Future Year 2025 Conditions

The future conditions scenarios introduces several new variables to the transportation outlook including the SR 4 Bypass, future growth of Greenhorn Creek development, and regional growth traffic showing up on the highways. These factors were accounted for in the intersection capacity analyses. Traffic volumes utilized for the year 2025 pm peak hour condition scenario are given in Figure 13. The specific lane configurations used at each intersection are given graphically in the appendix for each intersection approach.

Our analysis took into account the additional growth that is expected to come from Greenhorn Creek Road, and we assigned this traffic globally to the street system using a growth rate factor from year 2005 to year 2025 of 1.76[3]. These growth rates were applied to the existing traffic as well as to the Greenhorn Creek development that has yet to fully build out. The residential subdivision along Greenhorn Creek is estimated to be at about 60% built out, making the 1.78 factor appropriate to also represent the growth needed to build out.

Another factor that will help to reduce traffic volumes along Main Street south of the SR 4 intersection is the SR 4 Bypass extending southeast from SR 49 (scheduled to begin construction in the next few years). The capacity analysis for the year 2025 time frame is summarized in Table 3. The same traffic assignment pattern illustrated in Figures 7-12 was also used in the year 2025 analysis, but the volumes from Greenhorn Creek Road that were shifted were increased by the factor of 1.78 to bring volumes up to a year 2025 level and to reflect the remaining 40% growth potential. This traffic pattern shift was then added to the year 2025 traffic projections to get a total volume for each of the six scenarios. The results of the year 2025 analyses are summarized in Table 3.

Table 3 shows that under all scenarios if the connector road(s) are set in place, that there would be significant improvement to average delays at the intersection of Main Street and Murphy's Grade Road (improving from 42.4 seconds of average delay to 30.2 seconds). This would reduce congestion on Main Street at Murphy's Grade Road from LOS D to LOS C conditions. For this reason, the City should implement the road connectors because it will directly provide overall relief to one of the busiest and overloaded intersections in the City.

[3] This was calculated using the year 2025 growth projections and dividing by the year 2005 traffic turning movement totals.

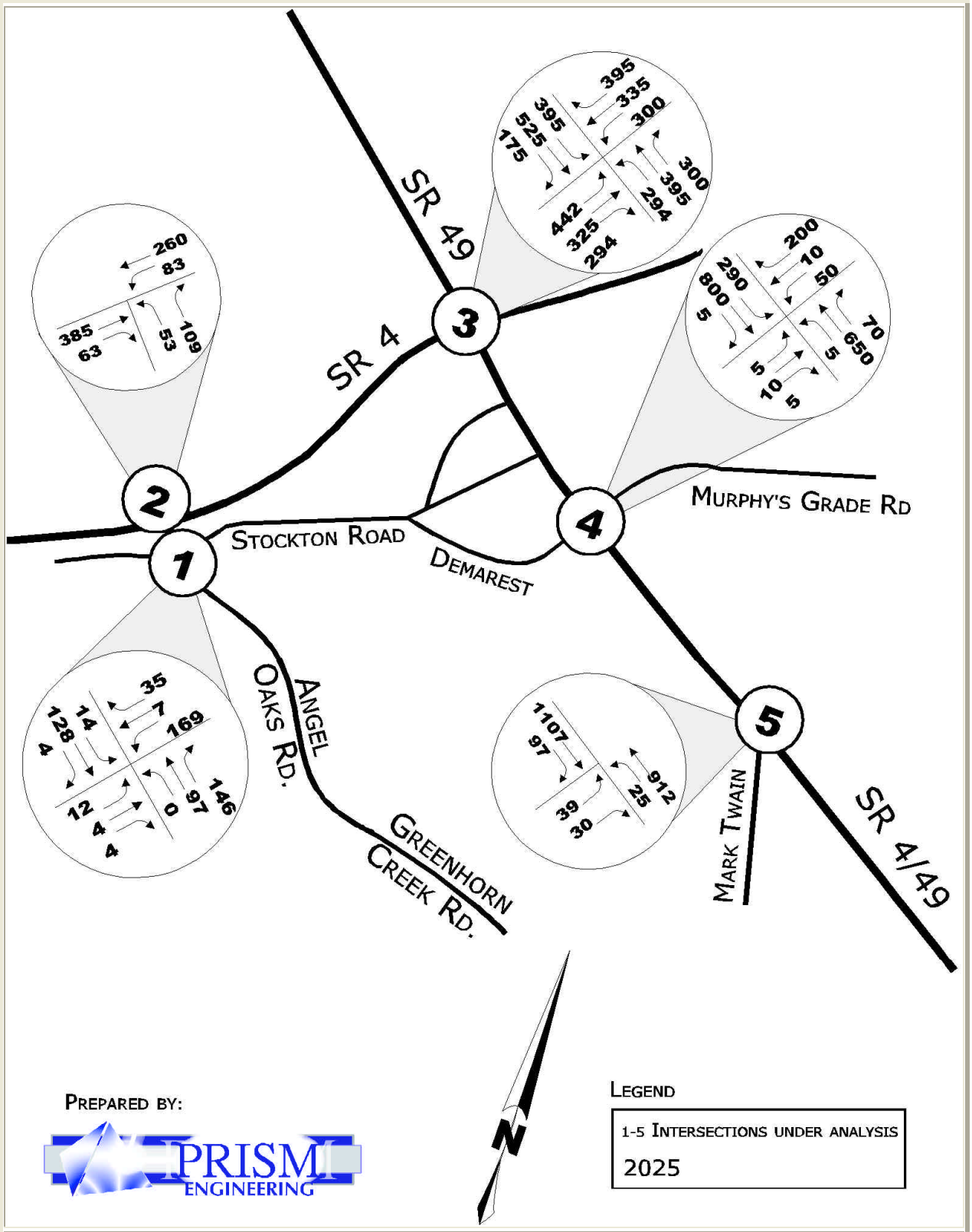


Figure 13 Year 2025 PM Peak Hour Traffic Volumes

Neighborhood Impacts and Benefits

It is understood that any increase in traffic to neighborhood streets is not a welcome impact to the people who live on those streets. However, it is important to note that when circulation opportunities are increased, the shifting in traffic patterns may not be all negative impacts. It is possible that even reduced volumes are possible at certain locations when shorter trips are made. The streets that stand to be potentially impacted by some of the traffic from Greenhorn Creek Road residents if the connector road(s) are installed include Tuolumne Avenue, Amador Avenue, San Joaquin Avenue, Stanislaus Avenue, Gold Cliff Road, Hillcrest Street, Mark Twain Road, and Finnegan Lane. The existing traffic volumes on these streets are small because the streets serve only the local residents who live on them.

If the connector roads installed to allow traffic to go back and forth between the two residential areas (the older historic area to the east of Greenhorn Creek Road, and the newer homes to the west of Greenhorn Creek Road), it stands to reason that traffic will go both directions, or in other words, both residential areas will benefit from additional circulation opportunities. Not only will traffic from the new residential areas travel easterly to destinations within the City along Main Street, etc., but traffic from the historical residential areas will be able to travel westerly to Greenhorn Creek Road and then north to SR 4 essentially bypassing the Main Street congestion entirely when they need to make a trip to say, Copperopolis, Stockton or even San Andreas, for example. The connector roads can also serve as a "bypass" of Main Street congestion for residents living in the historical neighborhoods as well when they need to make a longer trip to destinations west of the City. No longer would a resident living on Gold Cliff Road or Tuolumne Avenue need to travel to Mark Twain or Stanislaus Avenue to enter Main Street when they need to go to Stockton (or to future shopping areas along Angel Oaks Drive when it is extended north in the future). The traffic growth along Main Street, and the congestion that goes along with that growth can be avoided by the residents living in the historical areas.

Overall, the connector roads provide better circulation opportunities for the whole City, and do not *only* benefit the newer neighborhoods. They will benefit the historical neighborhoods as well, and thus further reduce some impacts that the historical residential areas make on Main Street when residents need to make a trip to the west or north (depending on how close to Greenhorn Creek Road they live).

In order to better compare the connector road alternatives in an LOS analyses we assumed a "worst-case" scenario examining traffic impacts that might occur along Main Street intersections if the connector roads were used

primarily by residents of the Greenhorn Creek Road corridor only. Through this analysis it was possible to see that the connector roads will have the effect of lowering volumes along Main Street and improving levels of service to downtown streets. Even though the delay for traffic entering Main Street from the historical residential area streets such as Mark Twain Road increased, the increase in delay did not fail the intersection, but only slightly increased the current traffic delay for side street traffic (increasing delay for Mark Twain traffic from 22.8 seconds to 24.7 on up to 35 depending on the alternative). This is still tolerable for the existing year 2005 condition. In the year 2025 condition, however, the traffic volumes along Main Street nearly double, and the side street traffic on say, Mark Twain Road, is unable to get out onto Main Street even without the connector road traffic. Only a signal will mitigate this LOS F condition for the side streets. Table 3 shows that there is projected to be a delay of 293 seconds for Mark Twain Road traffic getting out onto Main Street in the year 2025. This 5 minute average delay is intolerable and will require mitigation with a signal.

It is likely that as residents of the older historical neighborhoods use the connector roads to make all trips to the west of Angels Camp (via Greenhorn Creek Road to SR 4), that the City will see even further reductions to traffic volumes on Main Street (estimated at between 5% and 10% reductions) over existing and projected year 2025 conditions. This could result in an even better level of service than is shown in Tables 2 and 3 for all intersections along Main Street.

Traffic Calming

The existing streets in the older historical residential neighborhoods are narrow, and as a result, have traffic calming effects “built in” to slow traffic. Because of these narrow roads it is not anticipated that any exchange in traffic via connector roads between the two separated residential areas will result in any significance of speeding vehicles. Some roads may need to be widened to a 24 foot width to better provide for two-way traffic flows.

Gold Cliff Road/Hillcrest/Mark Twain is the most logical direct path between Greenhorn Creek Road and Main Street. If this path is improved to a 24 foot width as one of the connector road improvement projects, the other roads (Tuolumne and Finnegan) would not need to be improved to handle any additional traffic. The Gold Cliff/Hillcrest/Mark Twain route would have ample capacity to handle all traffic that might shift with connector road installations. The other two paths along Tuolumne and Finnegan would keep traffic volumes lower because of “built in” traffic calming effects such as narrow cross section and extreme horizontal curvature.

Table 3

Intersection Level of Service Analyses Summary for Year 2025 PM Peak Hour Scenarios

Year 2025 Scenarios	No Access Options		Access Road A		Access Road B		Access Road C		Access Roads A&B		Access Roads B&C		Access Roads A,B,&C	
Intersection	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 Angel Oaks and Stockton Road	5.4	A	4.3	A	4.3	A	4.4	A	4.3	A	4.3	A	4.3	A
2 SR 4 and Angel Oaks Road	3.3	A	2.3	A	2.3	A	3.3	A	2.3	A	2.3	A	2.3	A
3 SR 4 and SR 49	43.3	D	41.8	D	41.8	D	42.7	D	41.8	D	41.8	D	41.8	D
4 SR 49 and Murphy's Grade Road	42.4	D	30.2	C	30.2	C	30.2	C	30.2	C	30.2	C	30.2	C
5 SR 49 and Mark Twain Road*	293	F*	569*	F*	1000+*	F*	338*	F*	884*	F*	884*	F*	700*	F*

*This only represents the side street Delay and LOS

Source: SynchroPro Software output, based on City's traffic volumes and projections (see appendix)

Conclusions and Mitigations

The SR 4/49 intersection was assumed to be significantly mitigated by the year 2025 with a new bypass constructed easterly of the intersection to take through traffic around the City. It is important to note that although this bypass takes SR 4 traffic around the City, there will still be growth of traffic volumes along Main Street from cumulative traffic growth in the area. Also assumed for improvements was significant widening at the SR 4/49 intersection to accommodate dual left turn pockets, etc. to handle the increase in traffic over the next 20 years.

Additional Signalized Intersections Needed

Currently there are two signals on Main Street, one at SR 4 and the other at Murphy's Grade Road. These signals help to move traffic more efficiently through the intersections. With future growth the intersection of Main Street and Murphy's Grade Road will go from LOS B/C today to LOS D by the Year 2025, even with the SR 4 Bypass installed. For this reason, it is necessary to find other ways to reduce unnecessary traffic impacts to Main Street. The installation of new connector access roads from Greenhorn Creek Road to the historical residential areas will allow for increased traffic circulation opportunities. Residents who live along Greenhorn Creek Road will be able to travel more directly easterly to Main Street when needed, and residents who live in the historical areas will be able to travel more directly westerly and northerly to SR 4 and beyond (especially when Angel Oaks Drive is extended in the future to SR 49).

The current side street delay for Mark Twain Road is an average of 22.8 seconds per vehicle during the pm peak hour. If the connector roads are installed, this delay is expected to increase (if the historical residents do NOT change their traffic patterns) by a range of 24.7 seconds of delay to a high of 35 seconds of delay, depending on the scenario (see Table 2). Although this is still not unusually high delay, the City needs to plan for a signal installation at this intersection in the future. By the year 2025 the delay without any connectors will be LOS F at 293 average seconds, or nearly five minutes per vehicle. A signal will be needed and should be planned.

The same is true for other intersections along Main Street such as Stanislaus Avenue and Finnegan Lane. These side streets will experience intolerable delays in the future as traffic grows along Main Street and makes it increasingly more difficult for traffic to get out. A traffic signal is the logical mitigation and is recommended for these three intersections in the future.

Road Widening Needed

If the connector roads are installed, then traffic patterns will shift. Some of the residents in the historical areas will make trips to the westerly through the residential streets to get to Greenhorn Creek Road, and some of the residents in the Greenhorn Creek area will make trips easterly through the residential streets to get to Main Street. This shifting in traffic flows will increase the number of vehicles that pass each other going opposite ways along say, the Gold Cliff/Hillcrest/Mark Twain route. This will require that the roads be brought to City standard cross section of 24 feet.

Since the volumes are low, even with the projected shift in traffic volumes, capacity is not the issue for the historical residential streets. The primary reason for the recommendation to widen certain roads is safety. Since there will be more two-way traffic on the roads, the need for wider cross section is increased. It is recommended that the entire road segment of Gold Cliff/Hillcrest/Mark Twain Road from Access B connector road to Main Street be improved to a 24 foot cross section.

Recommendations for Short Term

1. Install “Access B” Connector Road to Gold Cliff Road.
2. Widen entire road segment of Gold Cliff/Hillcrest/Mark Twain Road from Access B connector road to Main Street to a uniform 24 foot cross section to allow for safe passage of two-way traffic.
3. Install “Access A” Connector Road to Tuolumne Avenue.
4. Install “Access C” Connector Road to Finnegan Court/Lane.

Recommendations for Long Term

5. Install signal at Main Street and Mark Twain Road.
6. Consider installing signals on Main Street at Stanislaus Avenue
7. Consider installing signals on Main Street at Finnegan Lane

Appendix, Input Data and Sample Calculations

New AM and PM Peak Hour turning movement counts at study intersections

Start Date	13-Apr-05												
Site Code	SR 4 at Angel Oaks												
Street Nan	Angel Oaks southbound			Stockton westbound			Angel Oaks northbound			Stockton eastbound			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
4:00 PM	0	8	5	4	0	20	24	9	0	0	0	0	70
4:15 PM	1	18	6	1	0	19	17	17	0	0	1	0	80
4:30 PM	0	14	4	8	0	18	20	16	0	0	1	0	81
4:45 PM	0	16	2	7	0	26	15	18	0	0	1	0	85
5:00 PM	0	20	3	4	0	19	25	7	0	0	0	0	78
5:15 PM	0	13	3	5	1	18	11	3	0	0	0	0	54
5:30 PM	0	19	5	7	0	19	21	9	0	0	0	0	80
5:45 PM	1	16	3	2	0	30	19	15	0	1	0	0	87
	1	**68**	**15**	**20**	**0**	**82**	**77**	**58**	**0**	**0**	**3**	**0**	**324**

Start Date	13-Apr-05												
Site Code	SR 4 at Angel Oaks												
Street Nan	Angel Oaks southbound			Stockton westbound			Angel Oaks northbound			Stockton eastbound			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
7:00 AM	0	4	1	2	0	12	5	9	0	1	0	0	34
7:15 AM	0	5	4	3	0	8	7	7	0	0	0	0	34
7:30 AM	0	23	0	0	1	20	22	12	0	1	0	0	79
7:45 AM	0	17	2	6	2	30	29	12	0	0	1	0	99
8:00 AM	0	14	0	2	1	28	15	14	0	0	1	0	75
8:15 AM	0	15	2	5	0	18	17	10	0	1	0	0	68
8:30 AM	0	4	0	2	0	7	13	10	0	0	0	0	36
8:45 AM	0	9	2	3	1	10	16	12	0	1	0	0	54
	0	**69**	**4**	**13**	**4**	**96**	**83**	**48**	**0**	**2**	**2**	**0**	**321**

Start Date	13-Apr-05												
Site Code	SR 49 at Mark Twain												
	SR 49 northbound				Mark Twain eastbound				SR 49 southbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
7:00 AM	0	68	4	0	2	0	7	0	1	46	0	0	128
7:15 AM	0	107	5	0	4	0	7	0	4	64	0	0	191
7:30 AM	0	136	8	0	4	0	19	0	4	104	0	0	275
7:45 AM	0	160	9	0	11	0	33	0	6	110	0	0	329
8:00 AM	0	106	5	0	5	0	16	0	7	111	0	0	250
8:15 AM	0	106	2	0	6	0	6	0	2	97	0	0	219
8:30 AM	0	115	1	0	4	0	4	0	4	95	0	0	223
8:45 AM	0	107	1	0	2	0	9	0	5	98	0	0	222
	0	**508**	**24**	**0**	**26**	**0**	**74**	**0**	**19**	**422**	**0**	**0**	**1073**

Start Date	13-Apr-05												
Site Code	SR 49 at Mark Twain												
Street Nan	SR 49 northbound				Mark Twain eastbound				SR 49 southbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
4:00 PM	0	143	3	0	4	0	12	0	7	131	0	0	300
4:15 PM	0	129	4	0	3	0	8	0	7	185	0	0	336
4:30 PM	0	109	3	0	5	0	7	0	10	133	0	0	267
4:45 PM	0	133	6	0	7	0	5	0	16	137	0	0	304
5:00 PM	0	155	3	0	6	0	5	0	15	153	0	0	337
5:15 PM	0	143	2	0	4	0	3	0	8	154	0	0	314
5:30 PM	0	105	2	0	3	0	3	0	16	153	0	0	282
5:45 PM	0	115	7	0	4	0	11	0	16	169	0	0	322
	0	**518**	**14**	**0**	**17**	**0**	**22**	**0**	**55**	**629**	**0**	**0**	**1255**

Start Date	13-Apr-05												
Site Code	SR 4 at Angel Oaks												
Street Nan	SR 4 westbound				Angel Oaks northbound				SR 4 Eastbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
7:00 AM	0	32	4	0	5	0	7	0	1	20	0	0	69
7:15 AM	0	27	7	0	7	0	3	0	6	36	0	0	86
7:30 AM	0	30	22	0	8	0	4	0	2	57	0	0	123
7:45 AM	0	27	15	0	6	0	13	0	5	63	0	0	129
8:00 AM	0	29	11	0	11	0	5	0	3	40	0	0	99
8:15 AM	0	28	10	0	6	0	7	0	6	20	0	0	77
8:30 AM	0	27	4	0	10	0	4	0	1	38	0	0	84
8:45 AM	0	22	8	0	11	0	5	0	3	40	0	0	89
	0	**113**	**55**	**0**	**32**	**0**	**25**	**0**	**16**	**196**	**0**	**0**	**437**

Start Date	13-Apr-05												
Site Code	SR 4 at Angel Oaks												
Street Nan	SR 4 westbound				Angel Oaks northbound				SR 4 Eastbound				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
4:00 PM	0	39	8	0	8	0	10	0	7	43	0	0	115
4:15 PM	0	33	11	0	10	0	4	0	10	50	0	0	118
4:30 PM	0	41	10	0	16	0	11	0	11	37	0	0	126
4:45 PM	0	36	10	0	16	0	8	0	7	46	0	0	123
5:00 PM	0	38	16	0	10	0	7	0	8	43	0	0	122
5:15 PM	0	45	11	0	1	0	6	0	5	28	0	0	96
5:30 PM	0	30	13	0	12	0	5	0	11	36	0	0	107
5:45 PM	0	31	14	0	9	0	7	0	6	37	0	0	104
	0	**148**	**47**	**0**	**52**	**0**	**30**	**0**	**36**	**176**	**0**	**0**	**489**

Year 2005 Scenarios (scenario listed in upper left corner on calculation sheet output).

Existing 2005
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	96	4	20	0	55	83	8	73	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	2	104	4	22	0	60	90	9	79	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	227	248	80	206	204	105	82			150		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	227	248	80	206	204	105	82			150		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	86	99	98	100			99		
cM capacity (veh/h)	705	651	980	745	688	950	1516			1431		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	130	150	90
Volume Left	8	104	0	9
Volume Right	2	22	90	2
cSH	731	770	1516	1431
Volume to Capacity	0.02	0.17	0.00	0.01
Queue Length 95th (ft)	1	15	0	0
Control Delay (s)	10.0	10.6	0.0	0.8
Lane LOS	B	B		A
Approach Delay (s)	10.0	10.6	0.0	0.8
Approach LOS	B	B		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		

Existing 2005
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	47	148	30	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	39	51	161	33	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			277		501	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		501	238
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		94	92
cM capacity (veh/h)			1286		509	801

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	238	39	51	161	33	67
Volume Left	0	0	51	0	33	0
Volume Right	0	39	0	0	0	67
cSH	1700	1700	1286	1700	509	801
Volume to Capacity	0.14	0.02	0.04	0.09	0.06	0.08
Queue Length 95th (ft)	0	0	3	0	5	7
Control Delay (s)	0.0	0.0	7.9	0.0	12.6	9.9
Lane LOS			A		B	A
Approach Delay (s)	0.0		1.9		10.8	
Approach LOS					B	

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	28.2%	ICU Level of Service		A
Analysis Period (min)	15			

Existing 2005
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	68	215	92	429	550	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	234	100	466	598	85
RTOR Reduction (vph)	0	195	0	0	0	41
Lane Group Flow (vph)	74	39	100	466	598	44
Turn Type		Prot	Prot			Perm
Protected Phases	4	4	5	2	6	
Permitted Phases						6
Actuated Green, G (s)	7.9	7.9	3.3	31.7	24.4	24.4
Effective Green, g (s)	7.9	7.9	3.3	31.7	24.4	24.4
Actuated g/C Ratio	0.17	0.17	0.07	0.67	0.51	0.51
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	294	263	123	1241	955	811
v/s Ratio Prot	c0.04	0.02	c0.06	0.25	c0.32	
v/s Ratio Perm						0.03
v/c Ratio	0.25	0.15	0.81	0.38	0.63	0.05
Uniform Delay, d1	17.3	17.0	21.8	3.5	8.3	5.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.3	32.1	0.2	1.3	0.0
Delay (s)	17.7	17.2	53.9	3.7	9.6	5.8
Level of Service	B	B	D	A	A	A
Approach Delay (s)	17.4			12.6	9.1	
Approach LOS	B			B	A	

Intersection Summary			
HCM Average Control Delay	12.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	47.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Existing 2005
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1605		1770	1849		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1605		1770	1849		1770	1863	1583
Volume (vph)	5	10	5	50	10	120	5	380	20	240	525	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	130	5	413	22	261	571	5
RTOR Reduction (vph)	0	5	0	0	117	0	0	2	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	24	0	5	433	0	261	571	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.2		6.1	6.1		0.6	25.0		12.2	36.6	36.6
Effective Green, g (s)		1.2		6.1	6.1		0.6	25.0		12.2	36.6	36.6
Actuated g/C Ratio		0.02		0.10	0.10		0.01	0.41		0.20	0.60	0.60
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		35		178	162		18	764		357	1127	958
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	c0.23		c0.15	0.31	
v/s Ratio Perm												0.00
v/c Ratio		0.46		0.30	0.15		0.28	0.57		0.73	0.51	0.00
Uniform Delay, d1		29.3		25.2	24.8		29.7	13.6		22.6	6.8	4.7
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		9.3		1.0	0.4		8.3	1.0		7.5	0.4	0.0
Delay (s)		38.6		26.2	25.3		38.0	14.6		30.1	7.2	4.7
Level of Service		D		C	C		D	B		C	A	A
Approach Delay (s)		38.6			25.5			14.8			14.3	
Approach LOS		D			C			B			B	

Intersection Summary					
HCM Average Control Delay	16.3	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.57				
Actuated Cycle Length (s)	60.5	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	53.3%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Existing 2005
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	22	17	14	518	629	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	18	15	563	684	60
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1307	714	743			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1307	714	743			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	96	98			
cM capacity (veh/h)	173	432	864			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	42	15	563	743
Volume Left	24	15	0	0
Volume Right	18	0	0	60
cSH	234	864	1700	1700
Volume to Capacity	0.18	0.02	0.33	0.44
Queue Length 95th (ft)	16	1	0	0
Control Delay (s)	23.7	9.2	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	23.7	0.2		0.0
Approach LOS	C			

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	46.4%	ICU Level of Service	A	
Analysis Period (min)	15			

scenario 1 (access A)
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	48	4	20	0	32	51	8	48	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	2	52	4	22	0	35	55	9	52	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	157	161	53	136	134	62	54			90		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	157	161	53	136	134	62	54			90		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	94	99	98	100			99		
cM capacity (veh/h)	785	727	1014	827	752	1002	1551			1505		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	78	90	63
Volume Left	8	52	0	9
Volume Right	2	22	55	2
cSH	806	864	1551	1505
Volume to Capacity	0.01	0.09	0.00	0.01
Queue Length 95th (ft)	1	7	0	0
Control Delay (s)	9.5	9.6	0.0	1.1
Lane LOS	A	A		A
Approach Delay (s)	9.5	9.6	0.0	1.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	21.0%	ICU Level of Service	A	
Analysis Period (min)	15			

scenario 1 (access A)
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	22	148	30	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	39	24	161	33	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			277		447	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		447	238
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		94	95
cM capacity (veh/h)			1286		559	801

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	238	39	24	161	33	42
Volume Left	0	0	24	0	33	0
Volume Right	0	39	0	0	0	42
cSH	1700	1700	1286	1700	559	801
Volume to Capacity	0.14	0.02	0.02	0.09	0.06	0.05
Queue Length 95th (ft)	0	0	1	0	5	4
Control Delay (s)	0.0	0.0	7.9	0.0	11.8	9.7
Lane LOS			A		B	A
Approach Delay (s)	0.0		1.0		10.7	
Approach LOS					B	

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 1 (access A)
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	68	192	67	429	550	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	209	73	466	598	85
RTOR Reduction (vph)	0	176	0	0	0	40
Lane Group Flow (vph)	74	33	73	466	598	45
Turn Type		Prot	Prot			Perm
Protected Phases	4	4	5	2	6	
Permitted Phases						6
Actuated Green, G (s)	7.8	7.8	3.4	33.1	25.7	25.7
Effective Green, g (s)	7.8	7.8	3.4	33.1	25.7	25.7
Actuated g/C Ratio	0.16	0.16	0.07	0.68	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	282	253	123	1261	979	832
v/s Ratio Prot	c0.04	0.02	c0.04	0.25	c0.32	
v/s Ratio Perm						0.03
v/c Ratio	0.26	0.13	0.59	0.37	0.61	0.05
Uniform Delay, d1	18.0	17.6	22.1	3.4	8.1	5.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	7.5	0.2	1.1	0.0
Delay (s)	18.5	17.9	29.6	3.6	9.2	5.7
Level of Service	B	B	C	A	A	A
Approach Delay (s)	18.0			7.1	8.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

scenario 1 (access A)
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1605		1770	1845		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1605		1770	1845		1770	1863	1583
Volume (vph)	5	10	5	50	10	120	5	307	20	240	470	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	130	5	334	22	261	511	5
RTOR Reduction (vph)	0	5	0	0	116	0	0	2	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	25	0	5	354	0	261	511	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.1		6.1	6.1		0.6	21.9		12.3	33.6	33.6
Effective Green, g (s)		1.1		6.1	6.1		0.6	21.9		12.3	33.6	33.6
Actuated g/C Ratio		0.02		0.11	0.11		0.01	0.38		0.21	0.59	0.59
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		34		188	171		19	704		379	1091	927
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	0.19		c0.15	c0.27	
v/s Ratio Perm												0.00
v/c Ratio		0.47		0.29	0.15		0.26	0.50		0.69	0.47	0.00
Uniform Delay, d1		27.9		23.6	23.3		28.2	13.6		20.8	6.8	4.9
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		10.0		0.8	0.4		7.3	0.6		5.1	0.3	0.0
Delay (s)		37.9		24.5	23.7		35.5	14.1		25.9	7.1	4.9
Level of Service		D		C	C		D	B		C	A	A
Approach Delay (s)		37.9			23.9			14.4			13.4	
Approach LOS		D			C			B			B	

Intersection Summary				
HCM Average Control Delay	15.6	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	57.4	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	49.4%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

scenario 1 (access A)
25: Mark Twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	32	27	19	518	629	75
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	29	21	563	684	82
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1329	724	765			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1329	724	765			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	93	98			
cM capacity (veh/h)	167	425	848			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	64	21	563	765
Volume Left	35	21	0	0
Volume Right	29	0	0	82
cSH	231	848	1700	1700
Volume to Capacity	0.28	0.02	0.33	0.45
Queue Length 95th (ft)	27	2	0	0
Control Delay (s)	26.5	9.4	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	26.5	0.3		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 2 (access B)
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	48	4	20	0	32	51	8	48	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	2	52	4	22	0	35	55	9	52	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	157	161	53	136	134	62	54			90		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	157	161	53	136	134	62	54			90		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	94	99	98	100			99		
cM capacity (veh/h)	785	727	1014	827	752	1002	1551			1505		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	78	90	63
Volume Left	8	52	0	9
Volume Right	2	22	55	2
cSH	806	864	1551	1505
Volume to Capacity	0.01	0.09	0.00	0.01
Queue Length 95th (ft)	1	7	0	0
Control Delay (s)	9.5	9.6	0.0	1.1
Lane LOS	A	A		A
Approach Delay (s)	9.5	9.6	0.0	1.1
Approach LOS	A	A		

Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	21.0%	ICU Level of Service	A	
Analysis Period (min)	15			

scenario 2 (access B)
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	22	148	30	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	39	24	161	33	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			277		447	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		447	238
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		94	95
cM capacity (veh/h)			1286		559	801

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	238	39	24	161	33	42
Volume Left	0	0	24	0	33	0
Volume Right	0	39	0	0	0	42
cSH	1700	1700	1286	1700	559	801
Volume to Capacity	0.14	0.02	0.02	0.09	0.06	0.05
Queue Length 95th (ft)	0	0	1	0	5	4
Control Delay (s)	0.0	0.0	7.9	0.0	11.8	9.7
Lane LOS			A		B	A
Approach Delay (s)	0.0		1.0		10.7	
Approach LOS					B	

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 2 (access B)
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	68	192	67	429	550	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	209	73	466	598	85
RTOR Reduction (vph)	0	176	0	0	0	40
Lane Group Flow (vph)	74	33	73	466	598	45
Turn Type		Prot	Prot			Perm
Protected Phases	4	4	5	2	6	
Permitted Phases						6
Actuated Green, G (s)	7.8	7.8	3.4	33.1	25.7	25.7
Effective Green, g (s)	7.8	7.8	3.4	33.1	25.7	25.7
Actuated g/C Ratio	0.16	0.16	0.07	0.68	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	282	253	123	1261	979	832
v/s Ratio Prot	c0.04	0.02	c0.04	0.25	c0.32	
v/s Ratio Perm						0.03
v/c Ratio	0.26	0.13	0.59	0.37	0.61	0.05
Uniform Delay, d1	18.0	17.6	22.1	3.4	8.1	5.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	7.5	0.2	1.1	0.0
Delay (s)	18.5	17.9	29.6	3.6	9.2	5.7
Level of Service	B	B	C	A	A	A
Approach Delay (s)	18.0			7.1	8.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

scenario 2 (access B)
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1605		1770	1845		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1605		1770	1845		1770	1863	1583
Volume (vph)	5	10	5	50	10	120	5	307	20	240	470	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	130	5	334	22	261	511	5
RTOR Reduction (vph)	0	5	0	0	116	0	0	2	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	25	0	5	354	0	261	511	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.1		6.1	6.1		0.6	21.9		12.3	33.6	33.6
Effective Green, g (s)		1.1		6.1	6.1		0.6	21.9		12.3	33.6	33.6
Actuated g/C Ratio		0.02		0.11	0.11		0.01	0.38		0.21	0.59	0.59
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		34		188	171		19	704		379	1091	927
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	0.19		c0.15	c0.27	
v/s Ratio Perm												0.00
v/c Ratio		0.47		0.29	0.15		0.26	0.50		0.69	0.47	0.00
Uniform Delay, d1		27.9		23.6	23.3		28.2	13.6		20.8	6.8	4.9
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		10.0		0.8	0.4		7.3	0.6		5.1	0.3	0.0
Delay (s)		37.9		24.5	23.7		35.5	14.1		25.9	7.1	4.9
Level of Service		D		C	C		D	B		C	A	A
Approach Delay (s)		37.9			23.9			14.4			13.4	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	57.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

scenario 2 (access B)
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	50	44	29	518	629	113
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	48	32	563	684	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1371	745	807			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1371	745	807			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	65	88	96			
cM capacity (veh/h)	155	414	818			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	102	32	563	807
Volume Left	54	32	0	0
Volume Right	48	0	0	123
cSH	219	818	1700	1700
Volume to Capacity	0.47	0.04	0.33	0.47
Queue Length 95th (ft)	57	3	0	0
Control Delay (s)	35.0	9.6	0.0	0.0
Lane LOS	E	A		
Approach Delay (s)	35.0	0.5		0.0
Approach LOS	E			

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 3 access C
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	72	4	20	0	44	67	8	61	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	2	78	4	22	0	48	73	9	66	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	193	205	67	172	170	84	68			121		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	193	205	67	172	170	84	68			121		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	90	99	98	100			99		
cM capacity (veh/h)	743	687	996	784	719	975	1533			1467		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	104	121	77
Volume Left	8	78	0	9
Volume Right	2	22	73	2
cSH	767	814	1533	1467
Volume to Capacity	0.02	0.13	0.00	0.01
Queue Length 95th (ft)	1	11	0	0
Control Delay (s)	9.8	10.1	0.0	0.9
Lane LOS	A	B		A
Approach Delay (s)	9.8	10.1	0.0	0.9
Approach LOS	A	B		

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 3 access C
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	47	148	30	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	39	51	161	33	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			277		501	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		501	238
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		94	92
cM capacity (veh/h)			1286		509	801

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	238	39	51	161	33	67
Volume Left	0	0	51	0	33	0
Volume Right	0	39	0	0	0	67
cSH	1700	1700	1286	1700	509	801
Volume to Capacity	0.14	0.02	0.04	0.09	0.06	0.08
Queue Length 95th (ft)	0	0	3	0	5	7
Control Delay (s)	0.0	0.0	7.9	0.0	12.6	9.9
Lane LOS			A		B	A
Approach Delay (s)	0.0		1.9		10.8	
Approach LOS					B	

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 3 access C
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	68	204	80	429	550	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	222	87	466	598	85
RTOR Reduction (vph)	0	185	0	0	0	41
Lane Group Flow (vph)	74	37	87	466	598	44
Turn Type		Prot	Prot			Perm
Protected Phases	4	4	5	2	6	
Permitted Phases						6
Actuated Green, G (s)	7.9	7.9	3.3	32.1	24.8	24.8
Effective Green, g (s)	7.9	7.9	3.3	32.1	24.8	24.8
Actuated g/C Ratio	0.16	0.16	0.07	0.67	0.52	0.52
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	291	261	122	1246	963	818
v/s Ratio Prot	c0.04	0.02	c0.05	0.25	c0.32	
v/s Ratio Perm						0.03
v/c Ratio	0.25	0.14	0.71	0.37	0.62	0.05
Uniform Delay, d1	17.5	17.1	21.9	3.5	8.3	5.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	17.8	0.2	1.3	0.0
Delay (s)	17.9	17.4	39.7	3.7	9.5	5.8
Level of Service	B	B	D	A	A	A
Approach Delay (s)	17.5			9.4	9.0	
Approach LOS	B			A	A	

Intersection Summary				
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	48.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

scenario 3 access C
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1605		1770	1847		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1605		1770	1847		1770	1863	1583
Volume (vph)	5	10	5	50	10	120	5	344	20	240	498	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	130	5	374	22	261	541	5
RTOR Reduction (vph)	0	5	0	0	116	0	0	2	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	25	0	5	394	0	261	541	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.2		6.1	6.1		0.6	23.0		12.3	34.7	34.7
Effective Green, g (s)		1.2		6.1	6.1		0.6	23.0		12.3	34.7	34.7
Actuated g/C Ratio		0.02		0.10	0.10		0.01	0.39		0.21	0.59	0.59
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		36		184	167		18	725		372	1103	937
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	0.21		c0.15	c0.29	
v/s Ratio Perm												0.00
v/c Ratio		0.45		0.29	0.15		0.28	0.54		0.70	0.49	0.00
Uniform Delay, d1		28.4		24.3	23.9		28.8	13.7		21.4	6.9	4.9
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		8.6		0.9	0.4		8.3	0.8		5.9	0.3	0.0
Delay (s)		37.0		25.2	24.3		37.0	14.6		27.3	7.2	4.9
Level of Service		D		C	C		D	B		C	A	A
Approach Delay (s)		37.0			24.5			14.9			13.7	
Approach LOS		D			C			B			B	

Intersection Summary					
HCM Average Control Delay	15.9	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.50				
Actuated Cycle Length (s)	58.6	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	51.4%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

scenario 3 access C
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	22	17	14	528	649	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	18	15	574	705	60
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1340	735	765			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1340	735	765			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	96	98			
cM capacity (veh/h)	165	419	848			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	42	15	574	765
Volume Left	24	15	0	0
Volume Right	18	0	0	60
cSH	225	848	1700	1700
Volume to Capacity	0.19	0.02	0.34	0.45
Queue Length 95th (ft)	17	1	0	0
Control Delay (s)	24.7	9.3	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	24.7	0.2		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 4 and 5 (access A+B, B+C)
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	48	4	20	0	32	51	8	48	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	2	52	4	22	0	35	55	9	52	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	157	161	53	136	134	62	54			90		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	157	161	53	136	134	62	54			90		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	94	99	98	100			99		
cM capacity (veh/h)	785	727	1014	827	752	1002	1551			1505		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	78	90	63
Volume Left	8	52	0	9
Volume Right	2	22	55	2
cSH	806	864	1551	1505
Volume to Capacity	0.01	0.09	0.00	0.01
Queue Length 95th (ft)	1	7	0	0
Control Delay (s)	9.5	9.6	0.0	1.1
Lane LOS	A	A		A
Approach Delay (s)	9.5	9.6	0.0	1.1
Approach LOS	A	A		

Intersection Summary				
Average Delay		3.8		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A	
Analysis Period (min)	15			

scenario 4 and 5 (access A+B, B+C)
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	22	148	30	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	39	24	161	33	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			277		447	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		447	238
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		94	95
cM capacity (veh/h)			1286		559	801

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	238	39	24	161	33	42
Volume Left	0	0	24	0	33	0
Volume Right	0	39	0	0	0	42
cSH	1700	1700	1286	1700	559	801
Volume to Capacity	0.14	0.02	0.02	0.09	0.06	0.05
Queue Length 95th (ft)	0	0	1	0	5	4
Control Delay (s)	0.0	0.0	7.9	0.0	11.8	9.7
Lane LOS			A		B	A
Approach Delay (s)	0.0		1.0		10.7	
Approach LOS					B	

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 4 and 5 (access A+B, B+C)
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	68	192	67	429	550	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	209	73	466	598	85
RTOR Reduction (vph)	0	176	0	0	0	40
Lane Group Flow (vph)	74	33	73	466	598	45
Turn Type		Prot	Prot			Perm
Protected Phases	4	4	5	2	6	
Permitted Phases						6
Actuated Green, G (s)	7.8	7.8	3.4	33.1	25.7	25.7
Effective Green, g (s)	7.8	7.8	3.4	33.1	25.7	25.7
Actuated g/C Ratio	0.16	0.16	0.07	0.68	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	282	253	123	1261	979	832
v/s Ratio Prot	c0.04	0.02	c0.04	0.25	c0.32	
v/s Ratio Perm						0.03
v/c Ratio	0.26	0.13	0.59	0.37	0.61	0.05
Uniform Delay, d1	18.0	17.6	22.1	3.4	8.1	5.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	7.5	0.2	1.1	0.0
Delay (s)	18.5	17.9	29.6	3.6	9.2	5.7
Level of Service	B	B	C	A	A	A
Approach Delay (s)	18.0			7.1	8.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

scenario 4 and 5 (access A+B, B+C)
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1605		1770	1845		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1605		1770	1845		1770	1863	1583
Volume (vph)	5	10	5	50	10	120	5	307	20	240	470	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	130	5	334	22	261	511	5
RTOR Reduction (vph)	0	5	0	0	116	0	0	2	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	25	0	5	354	0	261	511	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.1		6.1	6.1		0.6	21.9		12.3	33.6	33.6
Effective Green, g (s)		1.1		6.1	6.1		0.6	21.9		12.3	33.6	33.6
Actuated g/C Ratio		0.02		0.11	0.11		0.01	0.38		0.21	0.59	0.59
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		34		188	171		19	704		379	1091	927
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	0.19		c0.15	c0.27	
v/s Ratio Perm												0.00
v/c Ratio		0.47		0.29	0.15		0.26	0.50		0.69	0.47	0.00
Uniform Delay, d1		27.9		23.6	23.3		28.2	13.6		20.8	6.8	4.9
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		10.0		0.8	0.4		7.3	0.6		5.1	0.3	0.0
Delay (s)		37.9		24.5	23.7		35.5	14.1		25.9	7.1	4.9
Level of Service		D		C	C		D	B		C	A	A
Approach Delay (s)		37.9			23.9			14.4			13.4	
Approach LOS		D			C			B			B	

Intersection Summary					
HCM Average Control Delay	15.6	HCM Level of Service	B		
HCM Volume to Capacity ratio	0.49				
Actuated Cycle Length (s)	57.4	Sum of lost time (s)	12.0		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A		
Analysis Period (min)	15				
c Critical Lane Group					

scenario 4 and 5 (access A+B, B+C)
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	41	35	24	518	629	93
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	45	38	26	563	684	101
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1349	734	785			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1349	734	785			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	72	91	97			
cM capacity (veh/h)	161	420	834			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	83	26	563	785
Volume Left	45	26	0	0
Volume Right	38	0	0	101
cSH	225	834	1700	1700
Volume to Capacity	0.37	0.03	0.33	0.46
Queue Length 95th (ft)	40	2	0	0
Control Delay (s)	30.1	9.5	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	30.1	0.4		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 6 (access A+B+C)
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	48	4	20	0	32	51	8	48	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	2	52	4	22	0	35	55	9	52	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	157	161	53	136	134	62	54			90		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	157	161	53	136	134	62	54			90		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	94	99	98	100			99		
cM capacity (veh/h)	785	727	1014	827	752	1002	1551			1505		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	78	90	63
Volume Left	8	52	0	9
Volume Right	2	22	55	2
cSH	806	864	1551	1505
Volume to Capacity	0.01	0.09	0.00	0.01
Queue Length 95th (ft)	1	7	0	0
Control Delay (s)	9.5	9.6	0.0	1.1
Lane LOS	A	A		A
Approach Delay (s)	9.5	9.6	0.0	1.1
Approach LOS	A	A		

Intersection Summary				
Average Delay		3.8		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A	
Analysis Period (min)	15			

scenario 6 (access A+B+C)
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	22	148	30	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	39	24	161	33	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			277		447	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		447	238
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		94	95
cM capacity (veh/h)			1286		559	801

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	238	39	24	161	33	42
Volume Left	0	0	24	0	33	0
Volume Right	0	39	0	0	0	42
cSH	1700	1700	1286	1700	559	801
Volume to Capacity	0.14	0.02	0.02	0.09	0.06	0.05
Queue Length 95th (ft)	0	0	1	0	5	4
Control Delay (s)	0.0	0.0	7.9	0.0	11.8	9.7
Lane LOS			A		B	A
Approach Delay (s)	0.0		1.0		10.7	
Approach LOS					B	

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 6 (access A+B+C)
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Volume (vph)	68	192	67	429	550	78
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	209	73	466	598	85
RTOR Reduction (vph)	0	176	0	0	0	40
Lane Group Flow (vph)	74	33	73	466	598	45
Turn Type		Prot	Prot			Perm
Protected Phases	4	4	5	2	6	
Permitted Phases						6
Actuated Green, G (s)	7.8	7.8	3.4	33.1	25.7	25.7
Effective Green, g (s)	7.8	7.8	3.4	33.1	25.7	25.7
Actuated g/C Ratio	0.16	0.16	0.07	0.68	0.53	0.53
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	282	253	123	1261	979	832
v/s Ratio Prot	c0.04	0.02	c0.04	0.25	c0.32	
v/s Ratio Perm						0.03
v/c Ratio	0.26	0.13	0.59	0.37	0.61	0.05
Uniform Delay, d1	18.0	17.6	22.1	3.4	8.1	5.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	7.5	0.2	1.1	0.0
Delay (s)	18.5	17.9	29.6	3.6	9.2	5.7
Level of Service	B	B	C	A	A	A
Approach Delay (s)	18.0			7.1	8.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

scenario 6 (access A+B+C)
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1605		1770	1845		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1605		1770	1845		1770	1863	1583
Volume (vph)	5	10	5	50	10	120	5	307	20	240	470	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	130	5	334	22	261	511	5
RTOR Reduction (vph)	0	5	0	0	116	0	0	2	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	25	0	5	354	0	261	511	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.1		6.1	6.1		0.6	21.9		12.3	33.6	33.6
Effective Green, g (s)		1.1		6.1	6.1		0.6	21.9		12.3	33.6	33.6
Actuated g/C Ratio		0.02		0.11	0.11		0.01	0.38		0.21	0.59	0.59
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		34		188	171		19	704		379	1091	927
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	0.19		c0.15	c0.27	
v/s Ratio Perm												0.00
v/c Ratio		0.47		0.29	0.15		0.26	0.50		0.69	0.47	0.00
Uniform Delay, d1		27.9		23.6	23.3		28.2	13.6		20.8	6.8	4.9
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		10.0		0.8	0.4		7.3	0.6		5.1	0.3	0.0
Delay (s)		37.9		24.5	23.7		35.5	14.1		25.9	7.1	4.9
Level of Service		D		C	C		D	B		C	A	A
Approach Delay (s)		37.9			23.9			14.4			13.4	
Approach LOS		D			C			B			B	

Intersection Summary					
HCM Average Control Delay	15.6	HCM Level of Service		B	
HCM Volume to Capacity ratio	0.49				
Actuated Cycle Length (s)	57.4	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	49.4%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

scenario 6 (access A+B+C)
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	36	30	21	518	629	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	33	23	563	684	91
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1338	729	775			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1338	729	775			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	76	92	97			
cM capacity (veh/h)	164	423	841			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	72	23	563	775
Volume Left	39	23	0	0
Volume Right	33	0	0	91
cSH	227	841	1700	1700
Volume to Capacity	0.32	0.03	0.33	0.46
Queue Length 95th (ft)	32	2	0	0
Control Delay (s)	28.0	9.4	0.0	0.0
Lane LOS	D	A		
Approach Delay (s)	28.0	0.4		0.0
Approach LOS	D			

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

Year 2025 Scenarios (scenario listed in upper left corner on calculation sheet output).

scenario 1 (access A) year 2025
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	48	4	20	0	32	51	8	48	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	4	4	92	8	38	0	61	98	15	92	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	276	283	94	240	236	110	96			159		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276	283	94	240	236	110	96			159		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	100	87	99	96	100			99		
cM capacity (veh/h)	637	619	963	702	657	943	1498			1421		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	138	159	111
Volume Left	13	92	0	15
Volume Right	4	38	98	4
cSH	675	753	1498	1421
Volume to Capacity	0.03	0.18	0.00	0.01
Queue Length 95th (ft)	2	17	0	1
Control Delay (s)	10.5	10.9	0.0	1.1
Lane LOS	B	B		A
Approach Delay (s)	10.5	10.9	0.0	1.1
Approach LOS	B	B		

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	32.0%	ICU Level of Service	A	
Analysis Period (min)	15			

scenario 1 (access A) year 2025
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	22	148	30	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	419	69	42	283	57	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			488		786	419
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			488		786	419
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		83	88
cM capacity (veh/h)			1075		347	634

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	419	69	42	283	57	75
Volume Left	0	0	42	0	57	0
Volume Right	0	69	0	0	0	75
cSH	1700	1700	1075	1700	347	634
Volume to Capacity	0.25	0.04	0.04	0.17	0.17	0.12
Queue Length 95th (ft)	0	0	3	0	15	10
Control Delay (s)	0.0	0.0	8.5	0.0	17.4	11.4
Lane LOS			A		C	B
Approach Delay (s)	0.0		1.1		14.0	
Approach LOS					B	

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 1 (access A) year 2025
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	3433	3539	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.55	1.00	1.00	0.95	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1986	1863	1583	3433	3539	1583	1814	1863	1583
Volume (vph)	442	325	294	300	335	395	294	395	300	395	525	175
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	480	353	320	326	364	429	320	429	326	429	571	190
RTOR Reduction (vph)	0	0	216	0	0	191	0	0	174	0	0	129
Lane Group Flow (vph)	480	353	104	326	364	238	320	429	152	429	571	61
Turn Type	Split		custom	Perm		Perm	Prot		Perm	Perm		Perm
Protected Phases	4	4	4		8		5	2			6	
Permitted Phases			4	8		8			2	6		6
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0	9.0	41.8	41.8	28.8	28.8	28.8
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0	9.0	41.8	41.8	28.8	28.8	28.8
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.20	0.10	0.47	0.47	0.32	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	688	373	317	398	373	317	344	1647	737	582	597	508
v/s Ratio Prot	0.14	c0.19	0.07		c0.20		c0.09	0.12			c0.31	
v/s Ratio Perm				0.16		0.15			0.10	0.24		0.04
v/c Ratio	0.70	0.95	0.33	0.82	0.98	0.75	0.93	0.26	0.21	0.74	0.96	0.12
Uniform Delay, d1	33.4	35.4	30.7	34.3	35.7	33.8	40.1	14.6	14.2	27.1	29.9	21.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	32.7	0.6	12.4	39.8	9.6	31.1	0.1	0.1	4.8	26.1	0.1
Delay (s)	36.5	68.1	31.3	46.7	75.5	43.4	71.2	14.7	14.3	32.0	56.0	21.7
Level of Service	D	E	C	D	E	D	E	B	B	C	E	C
Approach Delay (s)		44.7			54.8			31.4			41.9	
Approach LOS		D			D			C			D	

Intersection Summary					
HCM Average Control Delay	43.3	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.95				
Actuated Cycle Length (s)	89.8	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	79.6%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

scenario 1 (access A) year 2025
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1597		1770	1836		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1597		1770	1836		1770	1863	1583
Volume (vph)	5	10	5	50	10	200	5	650	70	290	800	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	217	5	707	76	315	870	5
RTOR Reduction (vph)	0	5	0	0	190	0	0	4	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	38	0	5	779	0	315	870	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.2		7.7	7.7		0.6	23.7		12.2	35.3	35.3
Effective Green, g (s)		1.2		7.7	7.7		0.6	23.7		12.2	35.3	35.3
Actuated g/C Ratio		0.02		0.13	0.13		0.01	0.39		0.20	0.58	0.58
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		35		224	202		17	716		355	1082	919
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	c0.42		c0.18	0.47	
v/s Ratio Perm												0.00
v/c Ratio		0.46		0.24	0.19		0.29	1.09		0.89	0.80	0.00
Uniform Delay, d1		29.5		23.9	23.8		29.9	18.5		23.6	10.0	5.4
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		9.3		0.6	0.5		9.4	60.2		22.4	4.4	0.0
Delay (s)		38.8		24.5	24.2		39.3	78.8		46.0	14.5	5.4
Level of Service		D		C	C		D	E		D	B	A
Approach Delay (s)		38.8			24.3			78.5			22.8	
Approach LOS		D			C			E			C	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

scenario 1 (access A) year 2025
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	32	27	19	518	629	75
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	61	52	36	991	1203	143
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2339	1275	1347			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2339	1275	1347			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	75	93			
cM capacity (veh/h)	37	204	511			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	113	36	991	1347
Volume Left	61	36	0	0
Volume Right	52	0	0	143
cSH	60	511	1700	1700
Volume to Capacity	1.89	0.07	0.58	0.79
Queue Length 95th (ft)	266	6	0	0
Control Delay (s)	569.1	12.6	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	569.1	0.4		0.0
Approach LOS	F			

Intersection Summary				
Average Delay		26.0		
Intersection Capacity Utilization		79.0%	ICU Level of Service	D
Analysis Period (min)		15		

scenario 2 (access B) year 2025
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	48	4	20	0	32	51	8	48	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	4	4	92	8	38	0	61	98	15	92	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	276	283	94	240	236	110	96			159		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	276	283	94	240	236	110	96			159		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	100	87	99	96	100			99		
cM capacity (veh/h)	637	619	963	702	657	943	1498			1421		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	138	159	111
Volume Left	13	92	0	15
Volume Right	4	38	98	4
cSH	675	753	1498	1421
Volume to Capacity	0.03	0.18	0.00	0.01
Queue Length 95th (ft)	2	17	0	1
Control Delay (s)	10.5	10.9	0.0	1.1
Lane LOS	B	B		A
Approach Delay (s)	10.5	10.9	0.0	1.1
Approach LOS	B	B		

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	32.0%	ICU Level of Service	A	
Analysis Period (min)	15			

scenario 2 (access B) year 2025
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	22	148	30	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	419	69	42	283	57	75
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			488		786	419
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			488		786	419
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		83	88
cM capacity (veh/h)			1075		347	634

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	419	69	42	283	57	75
Volume Left	0	0	42	0	57	0
Volume Right	0	69	0	0	0	75
cSH	1700	1700	1075	1700	347	634
Volume to Capacity	0.25	0.04	0.04	0.17	0.17	0.12
Queue Length 95th (ft)	0	0	3	0	15	10
Control Delay (s)	0.0	0.0	8.5	0.0	17.4	11.4
Lane LOS			A		C	B
Approach Delay (s)	0.0		1.1		14.0	
Approach LOS					B	

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

scenario 2 (access B) year 2025
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	3433	3539	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.55	1.00	1.00	0.95	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1986	1863	1583	3433	3539	1583	1814	1863	1583
Volume (vph)	442	325	294	300	335	395	294	395	300	395	525	175
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	480	353	320	326	364	429	320	429	326	429	571	190
RTOR Reduction (vph)	0	0	216	0	0	191	0	0	174	0	0	129
Lane Group Flow (vph)	480	353	104	326	364	238	320	429	152	429	571	61
Turn Type	Split		custom	Perm		Perm	Prot		Perm	Perm		Perm
Protected Phases	4	4	4		8		5	2			6	
Permitted Phases			4	8		8			2	6		6
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0	9.0	41.8	41.8	28.8	28.8	28.8
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0	9.0	41.8	41.8	28.8	28.8	28.8
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.20	0.10	0.47	0.47	0.32	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	688	373	317	398	373	317	344	1647	737	582	597	508
v/s Ratio Prot	0.14	c0.19	0.07		c0.20		c0.09	0.12			c0.31	
v/s Ratio Perm				0.16		0.15			0.10	0.24		0.04
v/c Ratio	0.70	0.95	0.33	0.82	0.98	0.75	0.93	0.26	0.21	0.74	0.96	0.12
Uniform Delay, d1	33.4	35.4	30.7	34.3	35.7	33.8	40.1	14.6	14.2	27.1	29.9	21.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	32.7	0.6	12.4	39.8	9.6	31.1	0.1	0.1	4.8	26.1	0.1
Delay (s)	36.5	68.1	31.3	46.7	75.5	43.4	71.2	14.7	14.3	32.0	56.0	21.7
Level of Service	D	E	C	D	E	D	E	B	B	C	E	C
Approach Delay (s)		44.7			54.8			31.4			41.9	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	43.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

scenario 2 (access B) year 2025
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1597		1770	1836		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1597		1770	1836		1770	1863	1583
Volume (vph)	5	10	5	50	10	200	5	650	70	290	800	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	217	5	707	76	315	870	5
RTOR Reduction (vph)	0	5	0	0	190	0	0	4	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	38	0	5	779	0	315	870	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.2		7.7	7.7		0.6	23.7		12.2	35.3	35.3
Effective Green, g (s)		1.2		7.7	7.7		0.6	23.7		12.2	35.3	35.3
Actuated g/C Ratio		0.02		0.13	0.13		0.01	0.39		0.20	0.58	0.58
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		35		224	202		17	716		355	1082	919
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	c0.42		c0.18	0.47	
v/s Ratio Perm												0.00
v/c Ratio		0.46		0.24	0.19		0.29	1.09		0.89	0.80	0.00
Uniform Delay, d1		29.5		23.9	23.8		29.9	18.5		23.6	10.0	5.4
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		9.3		0.6	0.5		9.4	60.2		22.4	4.4	0.0
Delay (s)		38.8		24.5	24.2		39.3	78.8		46.0	14.5	5.4
Level of Service		D		C	C		D	E		D	B	A
Approach Delay (s)		38.8			24.3			78.5			22.8	
Approach LOS		D			C			E			C	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

scenario 2 (access B) year 2025
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	50	44	29	518	629	113
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	96	84	55	991	1203	216
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2413	1311	1419			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2413	1311	1419			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	57	88			
cM capacity (veh/h)	32	194	480			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	180	55	991	1419
Volume Left	96	55	0	0
Volume Right	84	0	0	216
cSH	52	480	1700	1700
Volume to Capacity	3.44	0.12	0.58	0.83
Queue Length 95th (ft)	Err	10	0	0
Control Delay (s)	Err	13.5	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	Err	0.7		0.0
Approach LOS	F			

Intersection Summary				
Average Delay	679.9			
Intersection Capacity Utilization	86.6%	ICU Level of Service	E	
Analysis Period (min)	15			

scenario 3 (access C) year 2025
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	72	4	20	0	44	67	8	61	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	4	4	138	8	38	0	84	128	15	117	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	340	362	119	303	299	148	121			212		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	340	362	119	303	299	148	121			212		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	99	100	78	99	96	100			99		
cM capacity (veh/h)	578	559	933	638	606	898	1467			1358		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	21	184	212	136
Volume Left	13	138	0	15
Volume Right	4	38	128	4
cSH	617	677	1467	1358
Volume to Capacity	0.03	0.27	0.00	0.01
Queue Length 95th (ft)	3	27	0	1
Control Delay (s)	11.0	12.3	0.0	0.9
Lane LOS	B	B		A
Approach Delay (s)	11.0	12.3	0.0	0.9
Approach LOS	B	B		

Intersection Summary				
Average Delay		4.7		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A	
Analysis Period (min)	15			

scenario 3 (access C) year 2025
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1776		1770	1605		1770	1847		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1776		1770	1605		1770	1847		1770	1863	1583
Volume (vph)	5	10	5	50	10	120	5	344	20	240	498	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	176%	176%	176%	176%	176%	176%	176%	176%	176%	176%	176%	176%
Adj. Flow (vph)	10	19	10	96	19	230	10	658	38	459	953	10
RTOR Reduction (vph)	0	10	0	0	199	0	0	2	0	0	0	4
Lane Group Flow (vph)	0	29	0	96	50	0	10	694	0	459	953	6
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		2.7		8.6	8.6		0.7	23.8		12.3	35.4	35.4
Effective Green, g (s)		2.7		8.6	8.6		0.7	23.8		12.3	35.4	35.4
Actuated g/C Ratio		0.04		0.14	0.14		0.01	0.38		0.19	0.56	0.56
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		76		240	218		20	693		343	1040	884
v/s Ratio Prot		c0.02		c0.05	0.03		0.01	0.38		c0.26	c0.51	
v/s Ratio Perm												0.00
v/c Ratio		0.39		0.40	0.23		0.50	1.00		1.34	0.92	0.01
Uniform Delay, d1		29.5		25.0	24.4		31.2	19.8		25.5	12.7	6.2
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		3.3		1.1	0.5		18.3	34.6		170.7	12.2	0.0
Delay (s)		32.8		26.1	25.0		49.5	54.4		196.2	24.9	6.2
Level of Service		C		C	C		D	D		F	C	A
Approach Delay (s)		32.8			25.3			54.3			80.1	
Approach LOS		C			C			D			F	

Intersection Summary			
HCM Average Control Delay	64.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	63.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

scenario 3 (access C) year 2025
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	3433	3539	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.55	1.00	1.00	0.95	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1986	1863	1583	3433	3539	1583	1814	1863	1583
Volume (vph)	442	325	294	300	335	395	294	395	300	395	525	175
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	480	353	320	326	364	429	320	429	326	429	571	190
RTOR Reduction (vph)	0	0	216	0	0	191	0	0	174	0	0	129
Lane Group Flow (vph)	480	353	104	326	364	238	320	429	152	429	571	61
Turn Type	Split		custom	Perm		Perm	Prot		Perm	Perm		Perm
Protected Phases	4	4	4		8		5	2			6	
Permitted Phases			4	8		8			2	6		6
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0	9.0	41.8	41.8	28.8	28.8	28.8
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0	9.0	41.8	41.8	28.8	28.8	28.8
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.20	0.10	0.47	0.47	0.32	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	688	373	317	398	373	317	344	1647	737	582	597	508
v/s Ratio Prot	0.14	c0.19	0.07		c0.20		c0.09	0.12			c0.31	
v/s Ratio Perm				0.16		0.15			0.10	0.24		0.04
v/c Ratio	0.70	0.95	0.33	0.82	0.98	0.75	0.93	0.26	0.21	0.74	0.96	0.12
Uniform Delay, d1	33.4	35.4	30.7	34.3	35.7	33.8	40.1	14.6	14.2	27.1	29.9	21.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	32.7	0.6	12.4	39.8	9.6	31.1	0.1	0.1	4.8	26.1	0.1
Delay (s)	36.5	68.1	31.3	46.7	75.5	43.4	71.2	14.7	14.3	32.0	56.0	21.7
Level of Service	D	E	C	D	E	D	E	B	B	C	E	C
Approach Delay (s)		44.7			54.8			31.4			41.9	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	43.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

scenario 3 (access C) year 2025
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1597		1770	1836		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1597		1770	1836		1770	1863	1583
Volume (vph)	5	10	5	50	10	200	5	650	70	290	800	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	217	5	707	76	315	870	5
RTOR Reduction (vph)	0	5	0	0	190	0	0	4	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	38	0	5	779	0	315	870	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.2		7.7	7.7		0.6	23.7		12.2	35.3	35.3
Effective Green, g (s)		1.2		7.7	7.7		0.6	23.7		12.2	35.3	35.3
Actuated g/C Ratio		0.02		0.13	0.13		0.01	0.39		0.20	0.58	0.58
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		35		224	202		17	716		355	1082	919
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	c0.42		c0.18	0.47	
v/s Ratio Perm												0.00
v/c Ratio		0.46		0.24	0.19		0.29	1.09		0.89	0.80	0.00
Uniform Delay, d1		29.5		23.9	23.8		29.9	18.5		23.6	10.0	5.4
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		9.3		0.6	0.5		9.4	60.2		22.4	4.4	0.0
Delay (s)		38.8		24.5	24.2		39.3	78.8		46.0	14.5	5.4
Level of Service		D		C	C		D	E		D	B	A
Approach Delay (s)		38.8			24.3			78.5			22.8	
Approach LOS		D			C			E			C	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

scenario 3 (access C) year 2025
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	22	17	14	528	649	55
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	33	27	1010	1242	105
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2358	1294	1347			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2358	1294	1347			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	84	95			
cM capacity (veh/h)	37	199	511			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	75	27	1010	1347
Volume Left	42	27	0	0
Volume Right	33	0	0	105
cSH	57	511	1700	1700
Volume to Capacity	1.30	0.05	0.59	0.79
Queue Length 95th (ft)	162	4	0	0
Control Delay (s)	338.3	12.4	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	338.3	0.3		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	10.4		
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

4 ,5 and 6 (access AB,BC,ABC) year 2025
28: Stockton Rd & Angel Oaks Dr 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	7	2	2	48	4	20	0	32	51	8	48	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	2	52	4	22	0	35	55	9	52	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	157	161	53	136	134	62	54			90		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	157	161	53	136	134	62	54			90		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	94	99	98	100			99		
cM capacity (veh/h)	785	727	1014	827	752	1002	1551			1505		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	78	90	63
Volume Left	8	52	0	9
Volume Right	2	22	55	2
cSH	806	864	1551	1505
Volume to Capacity	0.01	0.09	0.00	0.01
Queue Length 95th (ft)	1	7	0	0
Control Delay (s)	9.5	9.6	0.0	1.1
Lane LOS	A	A		A
Approach Delay (s)	9.5	9.6	0.0	1.1
Approach LOS	A	A		

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		

4 ,5 and 6 (access AB,BC,ABC) year 2025
21: SR 4 & Angel Oaks Dr 6/10/2005

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	219	36	22	148	30	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	39	24	161	33	42
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			277		447	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		447	238
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		94	95
cM capacity (veh/h)			1286		559	801

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2
Volume Total	238	39	24	161	33	42
Volume Left	0	0	24	0	33	0
Volume Right	0	39	0	0	0	42
cSH	1700	1700	1286	1700	559	801
Volume to Capacity	0.14	0.02	0.02	0.09	0.06	0.05
Queue Length 95th (ft)	0	0	1	0	5	4
Control Delay (s)	0.0	0.0	7.9	0.0	11.8	9.7
Lane LOS			A		B	A
Approach Delay (s)	0.0		1.0		10.7	
Approach LOS					B	

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	28.2%	ICU Level of Service	A
Analysis Period (min)	15		

4, 5,6 (AB, BC, ABC) year 2025
12: SR 4 & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1863	1583	3433	1863	1583	3433	3539	1583	3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.55	1.00	1.00	0.95	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	3433	1863	1583	1986	1863	1583	3433	3539	1583	1814	1863	1583
Volume (vph)	442	325	254	300	335	395	250	395	300	395	525	175
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	480	353	276	326	364	429	272	429	326	429	571	190
RTOR Reduction (vph)	0	0	216	0	0	191	0	0	174	0	0	129
Lane Group Flow (vph)	480	353	60	326	364	238	272	429	152	429	571	61
Turn Type	Split		custom	Perm		Perm	Prot		Perm	Perm		Perm
Protected Phases	4	4	4		8		5	2			6	
Permitted Phases			4	8		8			2	6		6
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0	9.0	41.8	41.8	28.8	28.8	28.8
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0	9.0	41.8	41.8	28.8	28.8	28.8
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20	0.20	0.10	0.47	0.47	0.32	0.32	0.32
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	688	373	317	398	373	317	344	1647	737	582	597	508
v/s Ratio Prot	0.14	c0.19	0.04		c0.20		c0.08	0.12			c0.31	
v/s Ratio Perm				0.16		0.15			0.10	0.24		0.04
v/c Ratio	0.70	0.95	0.19	0.82	0.98	0.75	0.79	0.26	0.21	0.74	0.96	0.12
Uniform Delay, d1	33.4	35.4	29.8	34.3	35.7	33.8	39.5	14.6	14.2	27.1	29.9	21.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	32.7	0.3	12.4	39.8	9.6	11.7	0.1	0.1	4.8	26.1	0.1
Delay (s)	36.5	68.1	30.1	46.7	75.5	43.4	51.2	14.7	14.3	32.0	56.0	21.7
Level of Service	D	E	C	D	E	D	D	B	B	C	E	C
Approach Delay (s)		45.0			54.8			24.2			41.9	
Approach LOS		D			D			C			D	

Intersection Summary					
HCM Average Control Delay	41.8	HCM Level of Service		D	
HCM Volume to Capacity ratio	0.94				
Actuated Cycle Length (s)	89.8	Sum of lost time (s)		16.0	
Intersection Capacity Utilization	78.3%	ICU Level of Service		D	
Analysis Period (min)	15				
c Critical Lane Group					

4, 5,6 (AB, BC, ABC) year 2025
14: Murphys Grade & SR 49 6/10/2005

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.97		1.00	0.86		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782		1770	1597		1770	1833		1770	1863	1583
Flt Permitted		0.99		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1782		1770	1597		1770	1833		1770	1863	1583
Volume (vph)	5	10	5	50	10	200	5	577	70	290	745	5
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	11	5	54	11	217	5	627	76	315	810	5
RTOR Reduction (vph)	0	5	0	0	190	0	0	4	0	0	0	2
Lane Group Flow (vph)	0	16	0	54	38	0	5	699	0	315	810	3
Turn Type	Split			Split			Prot			Prot		Perm
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)		1.2		7.7	7.7		0.6	23.7		12.2	35.3	35.3
Effective Green, g (s)		1.2		7.7	7.7		0.6	23.7		12.2	35.3	35.3
Actuated g/C Ratio		0.02		0.13	0.13		0.01	0.39		0.20	0.58	0.58
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		35		224	202		17	715		355	1082	919
v/s Ratio Prot		c0.01		c0.03	0.02		0.00	c0.38		c0.18	0.43	
v/s Ratio Perm												0.00
v/c Ratio		0.46		0.24	0.19		0.29	0.98		0.89	0.75	0.00
Uniform Delay, d1		29.5		23.9	23.8		29.9	18.3		23.6	9.5	5.4
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		9.3		0.6	0.5		9.4	27.7		22.4	2.9	0.0
Delay (s)		38.8		24.5	24.2		39.3	46.0		46.0	12.3	5.4
Level of Service		D		C	C		D	D		D	B	A
Approach Delay (s)		38.8			24.3			46.0			21.7	
Approach LOS		D			C			D			C	

Intersection Summary					
HCM Average Control Delay	30.2	HCM Level of Service	C		
HCM Volume to Capacity ratio	0.81				
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	16.0		
Intersection Capacity Utilization	73.6%	ICU Level of Service	D		
Analysis Period (min)	15				
c Critical Lane Group					

scenario 4 and 5 (AB, BC) year 2025
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	41	35	24	518	629	93
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	78	67	46	991	1203	178
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2375	1292	1381			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2375	1292	1381			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	66	91			
cM capacity (veh/h)	35	199	496			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	145	46	991	1381
Volume Left	78	46	0	0
Volume Right	67	0	0	178
cSH	56	496	1700	1700
Volume to Capacity	2.60	0.09	0.58	0.81
Queue Length 95th (ft)	372	8	0	0
Control Delay (s)	884.0	13.0	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	884.0	0.6		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	50.4		
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

scenario 6 (access ABC) year 2025
25: mrk twain & SR 49 6/10/2005

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	36	30	21	518	629	84
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	69	57	40	991	1203	161
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2355	1284	1364			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2355	1284	1364			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	72	92			
cM capacity (veh/h)	36	201	504			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	126	40	991	1364
Volume Left	69	40	0	0
Volume Right	57	0	0	161
cSH	58	504	1700	1700
Volume to Capacity	2.19	0.08	0.58	0.80
Queue Length 95th (ft)	310	6	0	0
Control Delay (s)	700.9	12.8	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	700.9	0.5		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	35.3		
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		